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STRATEGIC DEFENSE INITIATIVE [SDI] PROGRAM

HEARING

BEFORE THE

COMMITTEE ON ARMED SERVICES

HOUSE OF REPRESENTATIVES

NINETY-NINTH CONGRESS

FIRST SESSION

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THE STRATEGIC DEFENSE INITIATIVE PROGRAM

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
Washington, DC, Thursday, June 6, 1985.

The committee met in executive session, pursuant to call, at 8:38 a.m., in room 2118, Rayburn House Office Building, Hon. Melvin Price (chairman emeritus) presiding.

OPENING STATEMENT OF HON. MELVIN PRICE, A REPRESENTATIVE FROM ILLINOIS, CHAIRMAN EMERITUS, HOUSE COMMITTEE ON ARMED SERVICES

Mr. PRICE. I think we can get started. Under the previous authority given to the committee, the committee will meet in closed session.

The Chair will recognize Mr. John Gardner, the Director of the Systems Division, Strategic Defense Initiative Organization.

Mr. Gardner.

Mr. STRATTON. Mr. Chairman, could I just make a comment?

I invited Mr. Gardner over here because he did such a remarkable job of explaining the strategic defense initiative before the North Atlantic Assembly meeting in Stuttgart a couple of weeks ago, and as usually happens in any allied assembly, whenever you bring up the SDI you get a whole batch of hostile questions and objections, and having seen a couple of examples of that, Mr. Gardner handled and fielded all of the questions with great skill and I felt that that kind of capability and ability to respond to critical questions was something that we needed here before the committee, and I appreciate the Defense Department making him available here this morning.

STATEMENT OF JOHN GARDNER, DIRECTOR OF THE SYSTEMS DIVISION, STRATEGIC DEFENSE INITIATIVE ORGANIZATION

Mr. GARDNER. Mr. Chairman, members of the committee, it is my pleasure to come here this morning and talk to you about the Strategic Defense Initiative.

What I have done is prepared a series of briefing charts that I believe will serve to describe the strategic defense initiative in a fair degree of detail both in terms of the way in which the initiative was produced from a technical viewpoint, as well as some of what we believe are the key features of the program from a military strategic viewpoint, give you a few highlights on where we are technically and some of the progress that we see ourselves making, and then conclude with some remarks on the programmatic status of our effort, attempting to clarify some of the major issues on obli-

gations and expenditures, and a comparison of the program content in that respect to other programs that are underway in the Department of Defense, so I have material that I believe can be covered in about 45 minutes or so. I am certainly at your disposal to answer any questions that come up as I go through this material, so let me then begin.

The program itself, of course, was begun as a result of the President's speech of March 23, and at that time there was pulled together a commission, the Fletcher Commission, which was charged with the responsibility of attempting to understand what possibilities there existed from a technical viewpoint of being able to build comprehensive defenses against ballistic missiles.

FLETCHER STUDY CONCLUSIONS

POWERFUL NEW TECHNOLOGIES ARE BECOMING AVAILABLE THAT JUSTIFY A MAJOR TECHNOLOGY DEVELOPMENT EFFORT TO PROVIDE FUTURE TECHNICAL OPTIONS FOR DEFENSE AGAINST NUCLEAR BALLISTIC MISSILES

PACE

- **NOW**
  - **↓ BROAD-BASED, FOCUSED TECHNOLOGY DEVELOPMENT**
- **EARLY 1990s — OPTION TO PROCEED IS AVAILABLE**

FEATURES

- **MULTIPLE LAYERS**
- **TECHNICAL DEMONSTRATIONS**
- **SURVIVABILITY**
- **INNOVATION**

This chart is a summary of one of the key findings of that committee of which I was the executive secretary and responsible in the Department of Defense for creating.

One of the first things that we did was attempt to understand what was different technically from, or what had changed technically since the last time we had looked at confidential defenses against ballistic missiles. Those of us that were involved in this effort and have been involved in ballistic defense for some time were actually surprised that it had been more than 15 years since we had actually attempted to determine whether we could defend against ballistic missiles and what had happened in that 15 year timeframe in major new technology developments in the United States of America, in the world. Some of those key technology developments are summarized here.

Actually they fall into several categories—the directed energy weapons technology, of course, has emerged in a 15-year timeframe and it emerged in ways that actually were more extensive than anybody had thought; both lasers, various categories, as well as

neutron particle beams had emerged as potential contributors to defense against ballistic missiles. This particular category of technology, of course, is the category that has given the program its coined name—stars wars—but it is important to understand that that is only one of the several major groups of technologies that have emerged to allow us to defend against ballistic missiles, at least give you the possibility.

Perhaps more important than the directed energy weapons are what has happened in the sensor world. The sensor technology has emerged [deleted] so this sensor technology has emerged, not only of that particular type, but also our ability to make precision measurements has emerged as well. Both laser radars and millimeter wave radars have emerged that will allow us to, we believe to take pictures if you will of reentry vehicles and other threatening objects to a degree of precision that we could only dream about in previous technologies, [deleted].

Finally, and to a significant extent the entire SDI initiative rests on the microelectronic revolution that has occurred. All of these technologies require the application of microelectronic technology for their real, their best applications. In the directed energy weapons, the microelectronics technology is what is the requisite technology to get the precision point and tracking necessary to direct these devices.

In the sensors area, it is the microelectronics technology packaged in small packages making calculations that are at a very high rate that allow you to process all the data that comes in from these sensors, so the program to a significant extent rests on the microelectronic technology.

There is one final technical area that is noted on here that I should mention because to a certain extent it came as a surprise to us in the strategic defense initiative. Previously we had thought of accelerators for interceptor vehicles to be comprised of conventional chemical rockets. Chemical rocket technology has an absolute limit to the amount of velocity that you can obtain from such rocket. Most people don't appreciate it, but [deleted] is as fast as you can accelerate anything with a chemical rocket technology.

Electromagnetic launchers applied to higher velocity guns offers the promise of going considerably beyond that—[deleted] are possible from this electromagnetic launchers technology, so what happened, what has happened in the last 15 years is that a whole new set of technologies have emerged, and the strategic defense program in essence is structured to be able to exploit those technologies; that is, to attempt to determine whether we can bring those technologies to bear to build comprehensive defenses against ballistic missiles.

The answers aren't available now. We don't know whether it will be possible to do that or not, or if so, just how well the defenses will be able to operate, but what we do have available is a whole new set of tools that were not available 15, 12 to 15 years ago when this problem was last examined, so the program is essentially one of exploiting those technical advances.

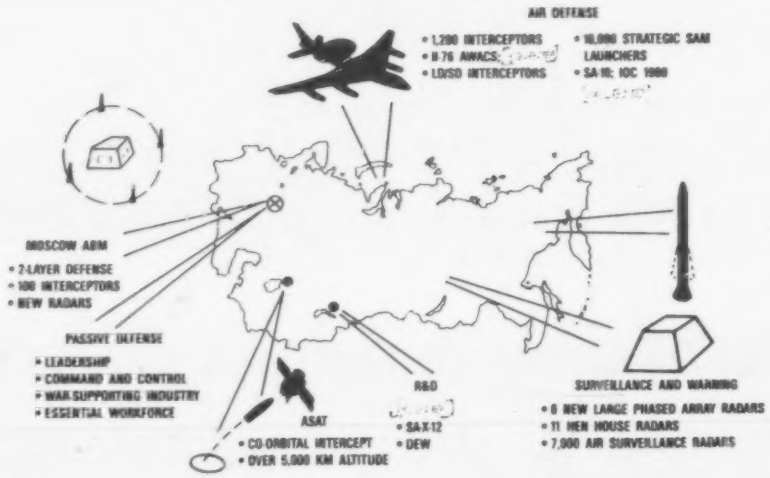
It is primarily comprised of a set of technical elements that fall into two broad categories. One is a set of technology elements that

work on the development of components and subsystems of these technologies.

The other set of program pieces of the program are experiments in which we try to pull together some of these components in order to do some significant experiment to assess how well we have been able to integrate these technologies into a meaningful defensive capability.

I think it is important in order to understand the program to understand it in the context of what the Soviet Union is doing. There probably is a good understanding of this fact, but we have found that in a number of places there is a goodly lack of understanding of what the Soviet Union is doing in this area.

(U) THE SOVIETS ARE VIGOROUSLY PURSUING STRATEGIC DEFENSE



Their program in strategic defense is in a number of respects much more comprehensive than ours. In addition to the ballistic missile defense R&D which is the component of the program that is involved in SDI, the Soviet Union, of course, has major programs going on in other areas as well, major programs going on in strategic air defense. They, of course have the program of an active ballistic defense in Moscow which is now being operated. They have also made extensive use of passive defense techniques such as hardening [deleted] and mobility, and finally, of course, they are in the process of building an extensive surveillance and warning system.

The overlay provides some additional details on some of these programs. One of the things that is important to understand is that in the area of air defense the Soviet Union is in possession of and building a comprehensive strategic air defense of their national value structure. Our estimates are that that air defense system, if we were to build it, and if it would be completed as we see it in the process of being completed, [deleted] a major investment in strategic air defenses.

Now it is important to understand that in context. We dismantled our air defense system in the late sixties and early seventies,

and we did so on what we felt were sound grounds. That is, we argued that it was not reasonable to maintain a defense against air breathing weapons if you had no defense against ballistic missiles, and the reasons for that are easy to understand.

The air defense system would simply be attacked by the ballistic missiles, destroyed. The air breathing forces would then come in behind that. The air defenses would have been destroyed and would be incapable of providing their intended objectives, so given that fundamental reality, it makes it a little bit disturbing to see the Soviet Union invest [deleted] in the strategic air defense at their value structure. It would imply that they are putting themselves into a position to be able to accompany that air defense system with a defense against ballistic missiles.

Now an interesting question is do they have such defense capabilities available to them? Well, the answer is yes. [Deleted.] This is the SAX-12. It has been tested in both modes. It is also rapidly deployable. In fact, SAX-12 is a mobile defense, and it is also, we believe, nearing the time in which it could enter into production and be deployed.

In addition, the Soviet Union has a major program going on in directed energy weapons. Our assessment is that their program in this area is considerably larger right now than the one we plan in SDI. It has been going on for considerably longer time and while the evidence is difficult to ascertain in detail, these are—it is difficult to understand what these programs are. There is at least some indirect evidence that would imply that they are making good progress in this program area so they have a major effort ongoing in the R&D and they are also in the process of deploying other necessary components of the strategic defense, in particular the air defense systems as well as these surveillance and warning radars.

The surveillance and warning radars, of course, are a necessary ingredient of the defense that would operate like this one. These defenses need a high performance surveillance and warning system to be able to direct them in the battle management sense, and so the Soviet Union has been for a number of years building and deploying these radars [deleted]. One of them, that one that is about in the location, is the one that has been identified as a violation of the ABM Treaty.

Now it would not be such a significant issue if it were not that the deployment of that radar in that location is significant from a defensive standpoint. Located in the vicinity of that radar is quite a large number of ICBM silos. If the radar has been deployed up at the periphery of the country where it could be legally deployed, the radar could not do the battle management function required in defense of these targets and they would be undefended. By locating it where it is, [deleted] this radar could provide the necessary surveillance and warning and battle management functions for that, and so as you stand back and look at this entire picture, not only the ballistic missile defense R&D but passive defense that the Soviet Union has made, their active defense of Moscow which is currently being upgraded and a major investment in strategic air defenses, I believe the conclusions are inexorable that the Soviet Union does not now and has not ever considered remaining vulnerable, that allowing their country to remain vulnerable to either strategic ballis-

tic missiles or strategic air breathing weapons is a desirable place for them to be, nor one that they intend to remain in over a long time, and they are putting all the effort that they can to the problem of changing the situation.

So it is in this backdrop I believe of activities in the Soviet Union ballistic missile defense and in strategic defense in general that the SDI program should be examined. The program itself is structured primarily to provide defense against ballistic missiles.

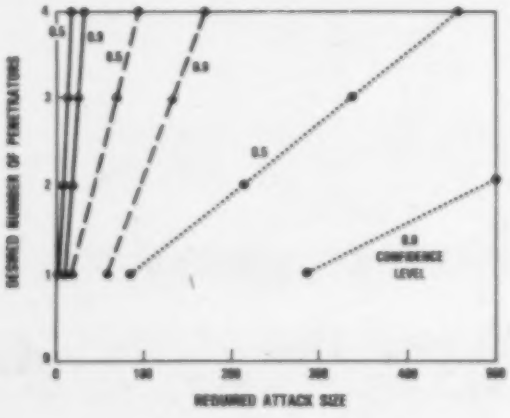
The issue of defense against air breathing forces is not a part of this program. As the strategic defense, as the defensive technology study was being completed, as it became clear that comprehensive defense against ballistic missiles might be possible, a companion study was conducted certainly at a much lower threshold of visibility but nevertheless it was conducted to determine whether or not defenses against air breathing weapons could be built that could be used as a companion to the SDI program.

The conclusions of that study were that the technical issues associated with defense against air breathing weapons were slightly less difficult than those against ballistic missiles and that the time required to develop those technologies was somewhat shorter than that required by defense against ballistic missiles, and since it was essential to know whether you could defend against ballistic missiles before you should prudently make any investment in air breathing weapons, this program is the one that is the pivotal program.

It is structured to provide comprehensive defenses against ballistic missiles. In order to do that, the conclusions were that we had to have multilayer defenses. We had to be capable of attacking and then to destroy the ballistic missiles during the entire portion of their flight, not only in their boost phase but also in the postboost and midcourse and terminal phases of their flight, and the program was structured to handle not only ICBM missiles but also the submarine launched ballistic missiles and also the intermediate range ballistic missiles that threaten our allies.

ATTACK REQUIREMENTS FOR LAYERED DEFENSES

(20% LAYER LEAKAGE)



The program is comprehensive from the viewpoint of ballistic missiles, but not comprehensive from the viewpoint of strategic missiles.

As we have tried to understand the significance of these ballistic missiles, we have also come to understand that there are two different ways of looking at defense against ballistic missiles.

One way is the defender's view. It has been the traditional view that we have taken in this country. That is, we have taken the view that someone has chosen to attack us. They have selected the weapons that they want to attack. They have identified the targets that they wanted to destroy, and they have launched those weapons.

The defensive problem has been looked at as beginning there. The defense then is structured to attempt to minimize the amount of damage that would come from that kind of an attack.

What we have found is that there is also another view of looking at defenses, and that is looking at defenses from the attacker's view, that is, what does it mean to an attacker to have a set of defenses between him and the targets that he intends to destroy? And we have attempted to understand that better, and the next chart attempts to illuminate what some of those issues are.

This is a simple set of calculations that almost any of us can do which attempts to relate the desired objective that an attacker would have, that is, getting one or two or three reentry vehicles through to any particular target, to a size of the attack that he is required to mount in order to get that objective when defenses stand between him and that target that he wants to destroy, and what is shown here is three different quality defenses—a single-layer defense, a two-layer defense, and a three-layer defense.

Right now we stand in the situation both here and in Western Europe where if the Soviet Union wants to destroy any particular target, he is required to allocate one, or two, or three reentry vehicles to that target, and he can be confident of its destruction.

If we would put a single layer defense between him and that target, he would have to expand the number of attacking reentry vehicles from 1, or 2, or 3, to 6 or 8, or 10, or 12. That's that red line.

If we put a two-layer defense, however, the number would indicate that he would have to apply to that attack, expand fairly dramatically, and for three-layer defense, it starts measuring in the hundreds number of reentry vehicles. You have to stand back and get the significance of this. Given that there are more than 2,000 targets that he would, could potentially want to attack in the United States and a comparable number in Western Europe, if he was confronted with a defense of this kind standing between him and that target, and he attempted to proliferate his forces in order to retain his military effectiveness, that proliferation would measure in the hundreds of thousands of reentry vehicles required—an absolutely impossible position for him to do—so what would be required would be for him to essentially considerably reduce the number of targets that he could afford to attack.

If, for example, he required 200 reentry vehicles to attack any particular target, only 40, or 50, or 60 targets can afford to be attacked out of that entire set.

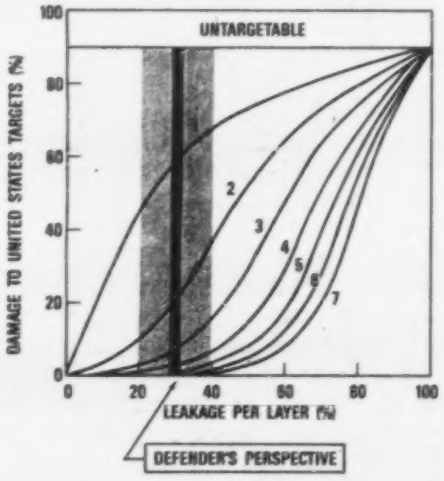
Now we believe that it is this potential that explains some of the vigor with which the Soviet Union has reacted to this program because strategic offensive forces cannot proliferate their way around defenses of this kind.

Now the other thing that is important to understand is that defenses of this type almost surely require that we deploy defensive components in space because in order to get this kind of performance we have to be capable of intercepting ballistic missiles in their boost phase, their postboost phase, and in their early portion of flight. That particular portion has great leverage with the defense, so the Soviet Union as you can see are attacking this program vigorously in an attempt to keep us from experimenting with defense systems that would operate in space, that would operate at this performance level.

If they can force us into lower performance defenses like this or perhaps even more importantly like this, it is fairly, it is fairly clear that they can satisfy their attacker's objectives even in the face of those relatively low performance defenses, so we believe that it is possible to understand the structure within which the SDI program is being discussed certainly from this viewpoint.

The next chart goes on and takes this one step further to look at the, to take a look at the other side of this problem, which is the protection side, the defender's view, and what is shown here is a chart relating to damage to the United States through the leakage per layer of the defense, and showing the number of layers of defense that are required to get to a given objective.

DEFENSE MISSION: PROTECTION



What this cross-hatched region shows are regions where we would hope the technology would allow us to operate, and as you can see, if you can only build defenses with a single layer or perhaps only with two layers, the reduction in damage that a defense system can provide to the United States is certainly limited and

the damage is significant, but if you can build defenses that operate at three, four, or five layers, you can see that the amount of damage that would be suffered by the United States from a first strike on us begins to get to be very small values, so our program is structured to be able to search for defenses that do operate at this multilayer level so that the potential would be for significant reductions in the damage that the United States would suffer in the face of an attack of ballistic missiles.

Now it is clear that in order to provide this degree of damage and since the Soviet Union does have air breathing weapons at their disposal, companion defenses against air breathing weapons would be required in order to fully satisfy, in order to fully satisfy these damage criteria, but on the other hand, you can also see that a multilayer defense system does have the theoretical potential of being able to provide for damage.

I thought I would make just a few points about the progress that we are making in the program since while—since the things that I have been discussing have to do with the technical possibilities, it is also important to ask whether or not we are making progress toward those, toward satisfying those possibilities.

First, I think that we are somewhat more optimistic about the advanced technologies now than we were a couple of years ago when we finished the program.

Our conclusions are that the defense system we would want to build that operated at the highest level of effectiveness would probably require the combination of smart nonnuclear projectiles and directed energy weapons of some kind, and the other thing to note is that the overall structure of the program has not changed in the last 18, 24 months. That is, we are still attempting to exploit these advanced technologies. We are still looking at comprehensive defenses against ballistic missiles, and we are still attempting to look at those defenses in the context of both deterrent and damage limit.

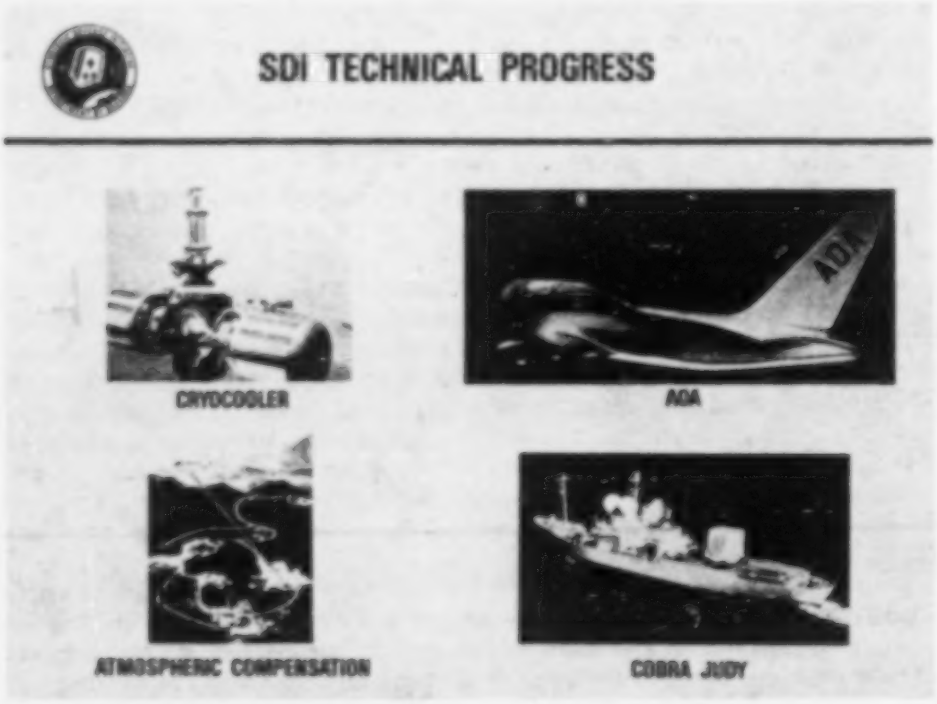
I guess one of the areas where we feel that we are making significant progress in which the promise is high is in the area of kinetic energy weapons. We recently last year completed some experiments of homing overlay experiment which showed, demonstrated that we could destroy a ballistic missile with a nonnuclear interceptor. The Army did this program. It was a marvelously successful program, and it was one of the, used an interceptor that weighed [deleted] in its homing state and delivered [deleted].

We are in the process now as a part of our antisatellite program of demonstrating a miniature homing vehicle that will only weigh [deleted], and that will be able to do, we believe, the same function. We are looking forward in the next several years of being able to demonstrate a third generation of this kind of homing vehicle that would weigh no more than [deleted] pounds and would be able to do the same job that required us [deleted] pounds in the homing overlay experiment, so what we are finding is that we have a good potential for building very small, nonnuclear homing kits to kill interceptors that can destroy ballistic missiles in their boost phase, postboost phase, and midcourse phases of flight.

This particular sequence of technical development we believe is one of the central possibilities for defenses that would be applied in a nearer term application.

In addition to this progress, we also have a significant amount of progress going on in the sensors world, and I have pulled out some of the highlights here. One of the things that we have going on for us is a program called the airborne optical adjunct. This is a program to install on an airplane, in this case a 767, [deleted] sensors that are capable of acquiring, tracking ballistic missiles from an atmospheric platform [deleted].

It is primarily the kind of a sensor that you would require when you would use it for a terminal defense system of either the United States or a multilayer defense system of our allies.



We are in the process of doing tests on the way in which the sensor would be installed in the airplane and we look forward to flight testing this program [deleted].

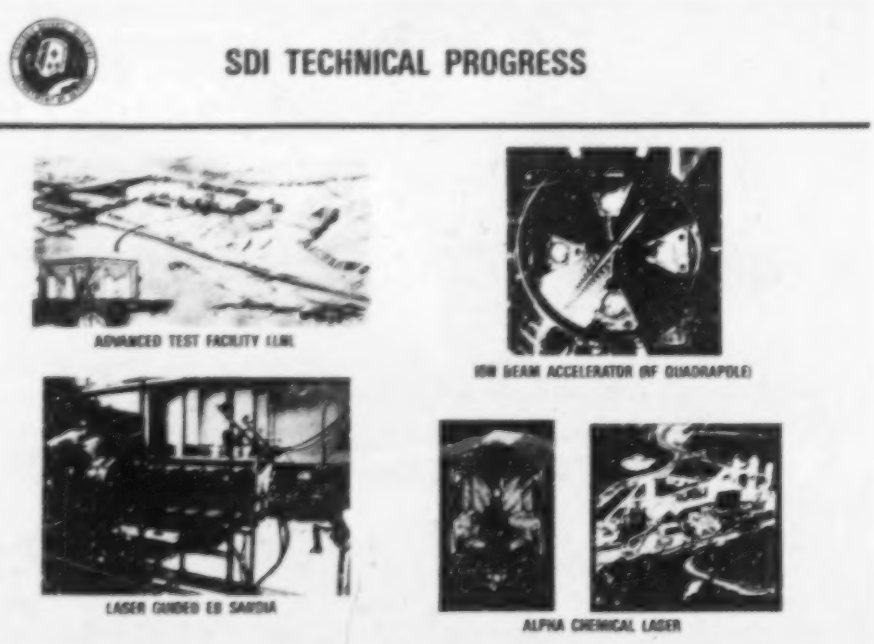
Another key ingredient to space-based sensors of the same type is an ability to have long-lived cryogenic coolers that keep these sensors cool, and [deleted].

We, of course, have a significant amount of effort going on in the collection of data. It is very important for us to understand the Soviet Union's program in ballistic missiles and we have several accomplishments of this program involved in data collection.

One of those is *Cobra Judy* ship which is where the radar has been installed, and finally in pointing and tracking arena, we have demonstrated that we can compensate for the turbulence in the atmosphere in order to provide very precision pointing from the ground-based locations.

The next chart highlights some of the areas in directed energy weapons. There I brought along just this chart which highlights progress in three different arenas—in the particle beam arena

shown here, and in the laser unit here. We have tests going on in the charged beam accelerator at Livermore in which we are looking at charged particle beam accelerators. At Sandia we are also working with charged beam accelerators. We have found that we can do laser channels of charted particles so that we can significantly increase the range in which they can operate.



At Los Alamos we have integrated an ion beam accelerator into the ground test stand of a neutral particle beam operating in Los Alamos. What we use, what we have used is a device called radial frequency quadropole. This particular device would, is essentially an interesting example of reverse technology transfer from the Soviet Union to us.

Soviet scientists described this particular device in the midseventies in the open literature. The Los Alamos scientists read that open literature, proceeded to attempt to build one of these devices themselves, and have found a way to build such a device and have installed it in this ground test accelerator. That is significant because this kind of a very compact initial accelerator is an essential feature of being able to deploy neutral particle beams in space since you require a very compact device, and this quadropole is about this big around and is about that long, is replacing a device that would be a quarter of the size of this room.

Finally, we have a significant amount of work going on in the chemical lasers. In fact, in a number of different lasers, not only chemical lasers, but excimer lasers and electric lasers; the progress on chemical lasers is somewhat farther along in the sense that we are in the process of building a laser that would operate in the [deleted] range which we believe is an important step in directed energy weapons.

I think in order to put this into context, what has happened, though, is that there has also occurred a change in view on directed energy weapons somewhat compared to what we previously had.

Initially we looked at these devices strictly as weapons. What we have found is that not only can we potentially use them as weapons, but they also are a very important source of discrimination capability, that is, an ability to be able to irradiate the threatening objects that are included in the ballistic missile threat to separate out the reentry vehicles from the nonthreatening decoys so that we can use very efficient means to destroy the reentry vehicles.

This application of directed energy technology we believe eases some of the technical stress in this area and might make it possible for us to use this technology more quickly than we would otherwise have been able to use it, so the program is structured in a way to exploit these technologies and this summarizes the basic way in which we lay out to do that.

What this shows is the 1985, 1986, 1987 funding, and it shows structured into the way in which the funds are being expended from a capability standpoint, a relatively small amount of funding is going into an area that we would describe as more mature technologies. In weapons these are essentially kinetic energy weapons. Sensors include both space-based optical sensors, airborne optical sensors, and terminal imaging radar, and then there is a battle management test bed being configured looking at what we have to integrate in these.

This particular set of technologies are those that are somewhat more mature, and significant experiments are being planned in this area.

If we were, if we were to have to go to a defense system capability quickly, we would almost surely have to do so using these technologies, so we have ensured that a relatively small amount of funding is allocated to and is devoted to these efforts. The bulk of the funding of the program shown here in this crosshatch here is going into advanced technologies, both advanced weapons, primarily directed energy weapons, and these hypervelocity launchers, new classes of sensors that are important, have higher performance ratio and higher performance battle management capability, and finally, there is a smaller amount of funds devoted to very innovative technologies.

Largely this innovative technology is looking at the high performance data processing capability and sensors since to a significant extent defense system capability is driven by your ability to sense what is going on and your ability to process and digest it, so the overall structure of the program is laid out this way.

What we are looking forward to is conducting this technology development program for several years in order to put ourselves in a position in about the 1990 timeframe to be able to decide whether we wanted to initiate the development of such devices.

We would anticipate that if you were to initially deploy defenses of this type you would likely want to augment them with more advanced technologies, and the program is structured to be able to do that, but you can see that the bulk of the funding of the program is devoted to advanced technologies.

The program is laid out, of course, from a technical standpoint into several major categories. Sensors, and this is the 1985 funding, sensor is funded most heavily, both 1985 and in 1986. Directed energy and kinetic energy weapons are funded next heavily, and

finally, the key but relatively less expensive efforts in systems analysis and battle management and lethality, survivability, and support are shown at these levels.

Now the program itself has been laid out built around the technology base that was already ongoing in this area. The DOD plans in these general technology areas would have consumed something like $15 to $18 billion over the 1985 to 1989 timeframe given the gross planning in R&D that was already underway, so what we have actually done, happened, is that this technology has been collected. It has been to a certain extent refocused and we believe configured in such a way that we get double duty out of R&D so that we provide support to the missions that were already underway, surveillance and warning being a key one, as well as defense initiative.

A point about these experiments that is worth making—what is shown here is the 1985 through 1989 funding of a number of these major experiments classified according to the sensors area, directed energy weapons area, the kinetic energy weapons area, and the DNC, and of the roughly $23 billion planned for the program with current planning which by the way compares to the $26 billion that was recommended by the Fletcher Commission, in this program area, about 35 percent or so of the program is going into major experiments of one kind or another.

These experiments are being configured to be in compliance with the ABM Treaty. In order to be in compliance with the ABM Treaty they have to fall in one of several categories. Category 1 is the conceptual, is called, is identified as conceptual design or laboratory testing. That is one category of acceptable testing.

Category 2 is field testing of devices that are not components or prototypes, and a significant amount of that falls in that category.

And category 3 is field testing of a fixed land-based component, and some small amount of those major experiments falls in this category.

The next chart summarizes the conclusions of the work that has gone on by independent groups that are attempting to assess whether or not the requirement complies with the treaty. The conclusion was the program was in complete compliance with the treaty, and in the main our programs fall into category 1 and category 2 areas in these experimental regions.

GENERAL CONCLUSION

THE SDI RESEARCH PROGRAM CAN BE CONDUCTED IN FULL COMPLIANCE WITH THE ABM TREATY

SDI NEAR-TERM TECHNOLOGY EXPERIMENTS

- WELL DEFINED AND CLEARLY COMPLIANT
- MOST CATEGORY 1, SOME CATEGORY 2

SDI MAJOR EXPERIMENTS

- BEING PLANNED TO BE FULLY COMPLIANT
- AS ALLOWED FIXED, LAND BASED ABM COMPONENTS
- OR, AS ALLOWED TESTS WHICH DO NOT INVOLVE ABM COMPONENTS OR DEVICES WITH THEIR CAPABILITIES

That is what we are really doing in this area, we are doing major experiments but we are not building the prototype hardware and we are not developing components.

A point about our ability for the program to be conducted within its budget—in fiscal year 1985, of course, we are conducting a budget. We are conducting the program at slightly less than $1.4 billion. With the programs that we have underway now, the expenditures—that would run out expenditures into fiscal year 1986, would account for something like $2.5 to $2.8 billion so the major experimental programs that we have underway now in those broad categories identified as well as the supporting component technologies that go on in support of that, the way they are laid out now would require for their full funding about that amount of money.

SDI FY86 BUDGET STATUS

PE	FY85 APPN	FY86 BUDGET	SASC* POSITION	HASC POSITION
SATKA	545.9	1386.3	–	898.3
DEW	378.4	965.5	–	725.5
KEW	256.0	858.7	–	508.7
SYSTEMS	99	243.3	–	173.3
SLKT	112	258.2	–	174.2
PROG MGMT	8	9.2	–	9.2
TOTAL	1397.3	3722.2	2972.0	2482.2

*$750M UNALLOCATED CUT

We have looked forward to initiating new, some new programs in this area, and in fact our total, the budget that we requested which was this amount of money, allowed us to start some additional new programs to exploit technical areas that have been identified since the Fletcher Commission has been created, and laid out programs we are conducting now, so there were additional programs started, that were intended to be started in fiscal year 1986.

As it stands now, what we are looking forward to is expenditure of an amount of, that amount of money given the programs that we already have underway, so we believe that we can lay out a program that can easily be accomplished, that the program is certainly doable the way is has been laid out. We are making progress with that. Some understanding of the scope of the program has been hard for us to identify and we made several attempts at this.

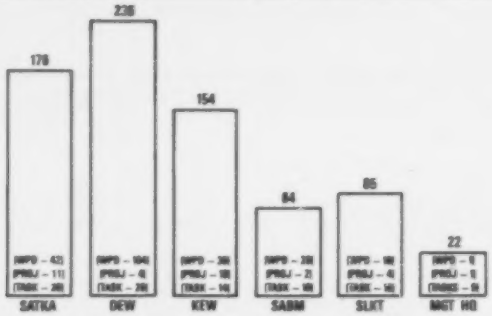
If I could have the next chart, I will describe another way in which we would intend to do so.

SDI EXPERIMENTS

	($)	85-89	
SATKA			
SSTS (AF)		1,349	
BSTS (AF)		1,644	
ADA (A)		429	
TIR (A)		392	
ADS (A)		250	
LWIR PROBE (A)		120	
DEW			
ALPHA/LODE/LAMP (AF)		214	
ATP (SDI)		248	
MIRACL & SEA LITE (NV)		41	[Deleted]
GBL UPLINK (SDI)		121	
TWO SIGNIFICANT TECH ACHIEVEMENTS (SDI)		750	
KEW			
SB KKV (AF)		886	
GND BASED HYPERVELOCITY RAILGUN (AF)		183	
SPACE BASED HYPERVELOCITY RAILGUN (AF)		212	
NEDI (A)		757	
ERIS (A)		788	
BIC (A)		123	
		298	
BM/C³	TOTAL EXPERIMENTS	8,503	36%
	OTHER SDI	15,016	
	SDI	23,519	

If you will look across our major program—SATKA, DEW, KEW, systems analysis and so forth—what you find is that we have a major number of contracts on-going right now. There are more than 700 contracts that are underway right now in various categories. I showed you a significant number of the major experiments that were being initiated and in addition to those major experiments, of course, there are numerous contracts underway for the development of component technology in these various areas, so from these 6 PE's, the program actually gets to more than 700 contracts, and these contracts are underway now, and it is this program that has called for the run-out cost that I described.

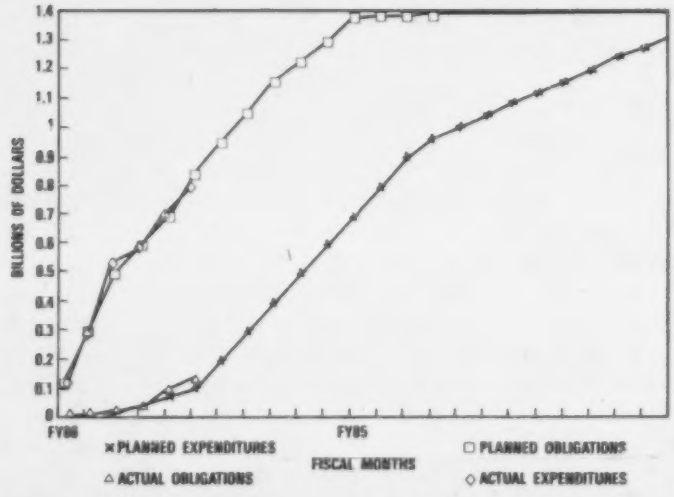
SDI CONTRACTS
AS OF APR 1985



	TOTAL
CONTRACTS	736
WPDs	221
TASKS	97
PROJECTS	32
PE	6

The next chart gets to another area in which there has been some misunderstanding, the question of obligations and expenditures—this is fiscal year 1986, 1985 and 1986—this is the obligation rate plan that we have laid out for ourselves and shown here is essentially our tracing along that plane. Expenditures inexorably lag obligations. This is an area that is oftentimes misunderstood.

SDI FY85
PROGRAM EXECUTION



What essentially happens is that when we commit ourselves to accomplishing some job, there is an inexorable lag between the time that we commit ourselves to doing the job and the bills coming in to be paid. A part of that lag comes from the accounting

system in the Government. It waits for a while to accumulate information before it records the fact that bills have come due to be paid.

Another part of that lag is found in the contractors themselves. Prime contractors wait for a while to record the fact that subcontractors have given them bills and they have paid them, and they also wait for a while before they send us, give us the bills, so there is an inexorable lag between the amount of time that we obligate the funds to be spent, work to be accomplished, and when the bills come to be paid. That lag is shown here. It is typical of any operation like this. It is typical of Government. It is typical of industry as a matter of fact.

SDI OBLIGATION/EXPENDITURE COMPARISONS*

	FY 1985 APPN	OBLIGATIONS (PERCENTAGES) MAR	OBLIGATIONS (PERCENTAGES) APR	EXPENDITURES (PERCENTAGES) MAR	EXPENDITURES (PERCENTAGES) APR
TOTAL ARMY R&D	4.4B	53	58	20	26
TOTAL NAVY R&D	9.3B	69	74	14	19
TOTAL AIR FORCE R&D	13.5B	51	57	20	24
SDIO	1.4B	56	62	9	12
DARPA	.7B	44	52	3	5
AIR FORCE STRATEGIC R&D	5.5B	44	51	10	15

*AS OF 30 APRIL 1985

Some understanding of how SDI compares to other operations is summarized here. This shows the SDI 1985 budget—$1.4 billion. This shows our obligations and expenditures as they have been collected March and April in the Government accounting system. As you can see, our expenditures, our obligations are up 56 to 62 percent. This compares it to the total Army, Navy and Air Force R&D programs as well as DARPA and the Air Force strategic R&D program.

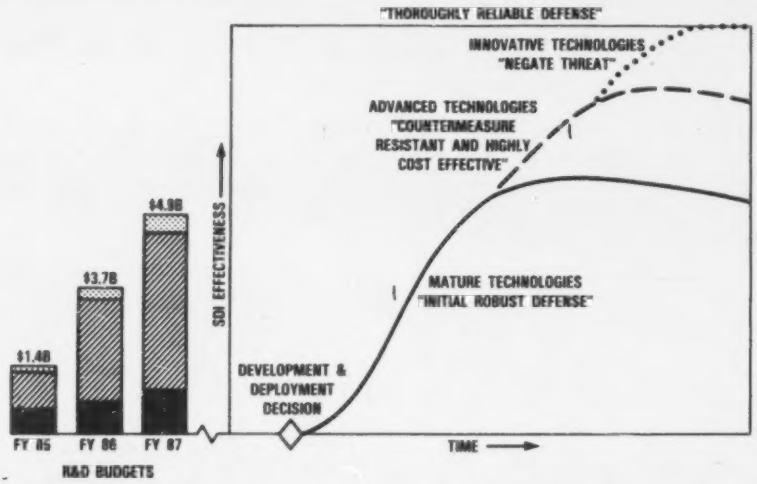
The point I would like to make here is SDI, of course, is sitting in the middle in the sense that, in its obligation of expenditure shown here, 9 to 12 percent; you can see that the program is not as good as the kind of expenditures, right, that are found in the total service R&D programs, but it compares quite favorably with the programs that are more like it which are technology development programs, and essentially diverse R&D programs of a very highly technical nature, more like what you find in DARPA.

As you can see, DARPA lags considerably, and more like what you see in the strategic R&D side of the Air Force, so we believe that the program is being handled responsibly in this area and being handled in the way you would expect, so let me conclude

with some comments on essentially a summary of what we believe the program is attempting to do.

We are working on a focused Research Technology Development Program. We believe that in a few years—4 or 5 or 6—we would have accomplished enough of this technology to be able to decide whether it was worth our while, and whether it would be militarily useful to attempt to defend ourselves against ballistic missiles. We believe that what can come out of this program would be a comprehensive defense against both the United States and our allies, and we believe that that defense would move, would be, would operate in such a way that it would significantly increase and improve our deterrent posture.

MEETING THE SDI GOAL



It would discourage attacks on us and our allies, and we believe that if the attacks would occur even in the face of that, that the damage that would result from these attacks could be reduced markedly from what we would suffer now, so we believe the program is restructured, is properly structured, and it is a significant, should be a significant component of our strategic program.

Thank you.

Mr. PRICE. Mr. Bennett.

Mr. BENNETT. Thank you. The thing that concerns me most is the defense mounted against us.

Do you feel that the logical thing to do would be to put a lot more missiles in the air to counteract that defense? Would that be the pressure?

Mr. GARDNER. We believe that what will happen is just the opposite of that. We believe that if you look at the Soviet Union, this problem from the Soviet Union's viewpoint, that faced with these kind of comprehensive defenses, they would convince themselves, they could easily convince themselves that proliferation of their offensive forces would not work.

I tried to give you some sense of that by the simple calculations that I showed on what this problem looks like from an attacker's viewpoint. He cannot proliferate his forces to such an extent that the effectiveness of defense would be overcome.

Mr. BENNETT. It is common wisdom—it may be inaccurate, but most people believe that about 80 percent would be stopped, about 20 percent would get through if you had this system now. That is common belief. It may not be correct.

You are telling me it is not correct I guess?

Mr. GARDNER. Well, I am saying that that is the kind of performance that you would expect to get out of single layer defense. Conventional wisdom essentially rests on the technologies that existed at the time that the Safeguard and Site Defense systems were built. They worked like simulator defense. Their effectiveness was such that they could intercept maybe 70 to 80 percent of incoming weapons, and given that kind of technology, yes, proliferation of offensive forces was an effective response, but given the kind of multilayer defenses that we believe this technology could afford us, proliferation is not an effective offensive response in that case we believe.

Mr. BENNETT. I hear the words you are saying. They are just a little bit incredible to me. I know they are not believable to me, but probably they are not believable because I have not had the opportunity to probe into the matter more.

I am not trying to argue with you. I am trying to find the facts.

Mr. GARDNER. Maybe a way to understand that better is to look at the problem a little more in its numerics. Actually the Soviet Union only has 1,200 or 1,400 boosters in their force now. Doubling that booster force for them generates, you know, 2,500 to 3,000 boosters. That still is a force size that is relatively easily handled if you can make intercept against that force size during its boost phase or postboost phase where you intercept, where you essentially destroy things wholesale if you will.

Mr. BENNETT. Apparently there is something I don't understand that you understand and maybe everybody else understands, but I just didn't. I thought the Russians had about 8,500 rounds or missiles that they could send at us. Are you telling me it is really 1,200?

Mr. GARDNER. That is—let me try to explain that more clearly.

Mr. BENNETT. Unless you do, I think you lost me.

Mr. GARDNER. Well, the Soviet Union has something [deleted] less than 10,000 reentry vehicles, individual nuclear weapons.

Mr. BENNETT. That's what I thought.

Mr. GARDNER. But those [deleted] reentry vehicles are actually deployed on something less than 1,500 boosters, so there is almost a quarter of magnitude difference between the number of reentry vehicles they have and the number of boosters that those weapons are delivered on.

Previously our defense systems could only operate against those reentry vehicles, so in effect there were 10,000 targets we had to handle. Applying this technology allows us to destroy those reentry vehicles in their boost phase before all the reentry vehicles are deployed so that the number of targets that we actually have to

defend against is reduced an order of magnitude if you look at it that way.

Mr. BENNETT. There are only 1,500 actual rounds that go into space to begin with?

Mr. GARDNER. Only 1,500 actual boosters lift up.

On top of those is a significantly larger number of independently targetable nuclear weapons that go to various targets. These defenses operate to destroy those ballistic missiles while they are still in the early phase of their flight right over the Soviet Union and before all these reentry vehicles have been aimed at their intended targets.

Mr. BENNETT. You think you have a pretty good chance of hitting them before they get out?

Mr. GARDNER. We believe these technologies allow us to do that in a number of different ways.

Mr. BENNETT. Thank you. My time is up.

Mr. PRICE. Mr. Dickinson.

Mr. DICKINSON. Thank you, Mr. Chairman. I want to thank you, Mr. Gardner, for a very comprehensive and understandable presentation, believable presentation.

There are some questions I am sure each of us has. One simple question—you say the radar systems that the Soviets built would be contrary to the SALT II, and they would be for battle management also.

It is my understanding that you really can't harden a system if it is the most susceptible target to destroy of anything we have to go after. Am I correct in that?

Mr. GARDNER. Those radars being so large and so massive cannot easily be hardened to nuclear effect. That is, a nuclear weapon that gets within half a mile of them or so would be almost sure to destroy them, that is correct.

Mr. DICKINSON. That was my point, so that regardless of what other systems they build, if they are going to use that radar system in this battle management and control of defensive systems that it launches off, that would be the most strategic point to go after, would it not? It is the most difficult to protect against blast or any other weapons system?

Mr. GARDNER. That is correct.

Mr. DICKINSON. OK.

Mr. GARDNER. I think it is important to add a point about that, though, Mr. Dickinson, that sometimes it is misunderstood.

One point is that even—that the conventional wisdom is that it is real easy to destroy those surveillance radars. As we have looked at that problem somewhat farther, somewhat further, they don't look so easy to destroy now as they initially did.

Mr. DICKINSON. Is this because of innate hardness or the potential for——

Mr. GARDNER. It is because of the way in which they have been put together. It is not part of the innate hardness, but it is because the radars have been put together in such a way that they are redundant to each other. In some cases, they are doubly redundant.

Mr. DICKINSON. My time is short. I want to interrupt with another question.

Ten years ago or thereabouts we started getting a great deal of agitation, conversation, publicity, on the charged particle beam lasers that the Soviets were developing and building, and I think that General Graham's High Frontier was one of the foremost prominent proponents of such an idea.

They developed a real area of people or group of people who strongly were in support of this. We have had others saying it is not practical. You can't generate enough energy to make one of these things workable and so there has never been a serious pursuit by this committee and others because that idea was poohpoohed.

From what you tell me, it is a fact practically. We are going to do it, are going to do it ourselves, and we are having some success at it. Could you tell me about that?

Mr. GARDNER. Yes.

Mr. DICKINSON. First, have I misstated it?

Mr. GARDNER. Well, I think that what has happened is that in the previous times we were not looking at directed energy weapons for defense against ballistic missiles.

Ten, twelve years passed and we paid almost no attention to directed energy weapons. That significant size R&D program that the Soviet Union had in directed energy weapons was bubbling up out of the intelligence community, and nobody knew how to look at it. Nobody knew.

Mr. DICKINSON. This is what I have just said. Are we right or wrong on where we stand?

Mr. GARDNER. Let me try to tell you what we believe is the case.

There is significant evidence that the Soviet Union is working on a significant number of directed energy weapons. It looks like their efforts are focused on lasers.

They also have work going on in neutral particle beams we believe, but it is difficult for us to understand, to know the detail about that work in neutral particle beams that they are doing.

What we have found out is that particle beams, both charged particle beams and neutral particle beams, have significant promise based on our research.

Mr. DICKINSON. OK. You say it is feasible, so we made a misjudgment in the past?

Mr. GARDNER. That is correct.

Mr. DICKINSON. OK. Now who monitors the success of the contracts? The 700 some odd contracts we have already gotten, that we have seen so many disappointments, so much wasted money, so-called Beltway Bandits. Everybody sets up a shop. They go and get a contract to study this, this feasibility study, that feasibility study. Now we have wasted a tremendous amount of money in the past in this regard, and we have 700-plus contractors already and there will be more coming down the pike.

Who is going to monitor those to see if they are wasteful? Are they productive and we are not again wasting the taxpayers' money?

Mr. GARDNER. We tried to set up three different layers of management and review of those contracts. First off, as you can see, it is a very comprehensive program. It is a large program.

What we have attempted to do is to take advantage of a centralized way of examining these programs so that the Strategic Defense Initiative Program has the ultimate responsibility for ensuring that these programs are properly managed.

Now what we have attempted to do and we believe are doing successfully is that we have elicited the support of, direct support from the people that are most capable to assist us in that program.

The Army's Ballistic Missile Defense Agency in Huntsville is managing a number of those programs. They have been involved in this program, as I am sure you know, for a number of years, but in addition to them, in those areas in which there are significant space activities we are using the Air Force's Space Division to monitor programs that are involved with space activity, particularly space-based sensors.

We are also taking advantage of technical expertise outside the Department of Defense. The Department of Energy laboratories—Los Alamos, Livermore and Sandia—are managing significant portions of this program for us, so we have reached out and essentially pulled together what we believe are the most technically capable people to help us manage the program that we can.

Now in addition to that, what we have also done is we are creating an independent technical assessment of what we are going with, and you will be hearing from us I believe fairly soon on the Scientific and Technical Advisory Committee that we are in the process of pulling together. That will provide us some independent insight from people that we believe are technically competent and have demonstrated wisdom in programs of this kind.

Mr. DICKINSON. Thank you.

Mr. PRICE. Mr. Stratton.

Mr. STRATTON. No questions, Mr. Chairman.

Mr. PRICE. Any other questions?

Mr. FOGLIETTA. I first off want to thank you for a very enlightening presentation. My colleague Mr. Dickinson said it was understandable.

Mr. GARDNER. Thank you.

Mr. FOGLIETTA. Mr. Dickinson sometimes is right. I would like to get back to a basic thought, and I certainly am not an expert or even knowledgeable in this field. I am just trying to understand it.

When you started out your presentation you said that we had been over the last 15 years relying on an offensive system of protection, and then at one point somebody sat back and said would you look at all the new technology we have, and the technology is available to us to do X, Y, and Z. Therefore, if we have this technology let us do X, Y, and Z.

Now that presents to me a bit of a problem because it seems to me that rather than we sitting down—when I say "we" I mean the executive branch and the legislative branch sitting down along with the experts like yourself and saying this is our policy, this is where we want to go in our defense in this Nation, therefore, let us let our technology be able to effect that policy that we want, but it seems to me that what we are doing here is saying rather than have a policy direct the technology, that we are having the technology direct our policy. Because we have this technology, therefore, let's do it that way.

I would like you to comment on that, and second I would like you to talk if you would, in your entire presentation you never talked about any of these devices, whatever they may have been, being nuclear powered.

The President's original, quote, star wars, unquote, speech stated that he was achieving, the policy was to achieve a nonnuclear defense for this Nation, yet I read lots of materials stating that many of these things that we, you are talking about today would be basically nuclear powered and we would have nuclear-powered devices in space.

I would like you to comment on both of those statements.

Mr. GARDNER. All right. Let me see if I can do so. First relative to the question of what is driving, policy or technology, what has happened is that as time has passed our ability to maintain our deterrent posture with a strictly and totally offensive force has become more and more stressed.

As I tried to point out, the Soviet Union, of course, not adhering to that policy of mutual vulnerability, have made their targets more and more difficult for us to attack and destroy particularly in a retaliatory way. They have made extensive use of passive defense, hardening, deception, mobility, and they have also mounted active defenses against our, against a portion of our strategic forces. They realized that approximately [deleted] the nuclear retaliatory weapons that this country has to deliver are delivered in air breathing weapons. Those strategic air defenses that they are in the process of deploying work directly against that retaliatory leg of our force, so as people looked into the future, it has looked more and more difficult for us to retain this purely invulnerable position in the face of the Soviet Union becoming less and less vulnerable, so it has been, it has been difficult for us, and if you go talk to the offensive side of the house, you will find that they are especially concerned about that.

That is kind of one dimension of it. The other dimension of it is that initially in our strategic posture we were more evenly balanced between offensive and defensive capability. At one time when our strategic forces, our strategic offensive forces were primarily air breathing forces, bombers, we also had a comprehensive air defense and we considered that our security was at its best when we had both defenses against the things that could attack us as well as an ability to counterattack.

It is only when we were confronted with an inability to have such defenses against ballistic missiles that we have attempted to make a virtue out of a necessity. If you can't defend against ballistic missiles, you try to find some way to retain your deterrent posture while remaining vulnerable to destruction by those weapons, but what has happened is as technology has emerged, the possibility of getting out of that box has opened its head, and this program is structured to attempt to determine whether that possibility can be realized.

I think it is also important to keep an even broader point in the perspective here. It is a peculiar situation that at this stage in the game, the entire value structure of the United States and our Western allies is capable of being destroyed by nuclear ballistic

missiles. As part of the reading of some investment literature not too long ago I read an interesting statistic.

According to this investment house, the asset value of the United States is some $25-plus trillion. That is, if you take a look at the entire investment houses, plants, communications, facilities, transportation, the entire thing, its value is something like $26 trillion, $25 to $30 trillion. That entire value structure right now is exposed to destruction, so another way of looking at this problem is, is it possible that we could reduce the exposure of that value structure to destruction? So in a larger sense even outside this strategic calculus that you see bandied around so often, there is also a larger issue here, and that is the question of whether we can actually defend ourselves from destruction, so this program is also structured to attempt to determine whether or not we can do that.

We don't know what the answer is, but we do know that we have a lot more tools to bring to bear to that problem than we ever had in the past, so we believe that it is to say the least prudent to attempt to do so.

Now let me move to the second part of the question which is the issue on nuclear weapons. It is very much our intention and our attempt to build defenses against nuclear-tipped ballistic missiles that are themselves nonnuclear.

We feel that we should do so for not only technical reasons but for also to certain extent for perception reasons. We don't want to be perceived as expanding the nuclear arsenals of the world while attempting to defend ourselves. It is an easy thing to misunderstand, and it is something we are trying to keep from being misunderstood.

On the other hand, it is also true that there are some technologies out there that we feel like we have to understand. We have to understand them not so much because we want to use them themselves as that we want to make sure that we understand whether or not or how they might be used against us.

One of those technologies, one project, is a project for nuclear driven x-ray laser. This is a technology that there is at least good reason to believe might be workable [deleted].

We believe that it is only prudent that we do so since the technology is something that we, even though we don't necessarily want to field it ourselves, we might very well have to defend ourselves to, and we need to understand how effective it can be. We need to understand how we could defend ourselves against it to shield ourselves from it.

Our program we think has to include those kinds of elements even though it is our overall objective to build the defenses with nonnuclear means.

Mr. FOGLIETTA. I thank you.

Mr. PRICE. Mr. Spence.

Mr. SPENCE. You answered to Mr. Dickinson's question a while ago relative to the amount of power, energy that it would take to propel a laser beam. I don't know if I ever got the answer or not. That was one of the big drawbacks for a long time. Mr. Dickinson indicated the power source would require such a large facility that it wouldn't work.

Have we been able to make advances in that area where we can reduce the power source now and make a laser weapon more feasible?

Mr. GARDNER. Well, we have some research projects we think are promising in that area. As I recall, the free electronic—well, first off we are doing research in lasers of a number of different types, two of which are good possibilities for ground-based applications.

One is an excimer laser and the other one is a free electron laser. One of the attractive features of the free electron laser is that it is a fairly efficient device. Upward of 20- to 30-percent efficiencies are available for that laser as I recall compared to 1 or 2 or 3 percent for other kinds of electronic lasers, so we believe that there is first off, there is some real promise in those, in that area.

Now in addition to those kinds of lasers, of course we also have lasers, have chemical lasers that are being, in which research is being conducted, and those lasers have the marvelous feature of having, of being their own source of power so that the chemical laser is marvelous in that it is its own—when it runs, it is self-generating in terms of its power. The combustion of the chemical rocket engine itself, that is an essential feature of that laser is it is its own creator of power, so it doesn't have to be plugged into any other source of power.

Now we are making significant progress in chemical lasers. We are in the process of installing a [deleted] MIRCL laser for test purposes in White Sands as part of this program. We have chemical lasers that are in the research phase that we believe will be an order of magnitude more powerful than that and more importantly, we are looking for optic systems that we could couple with those lasers that would make them even more effective than they would otherwise be able to be, adaptive segmented optic systems that allow you to focus the lasers in to very tight beams so that you can essentially burn holes through things much more effectively than you would otherwise be able to do, so we believe that we have several approaches to get around some of the difficult power requirements of some of these lasers.

Mr. SPENCE. That's all.

Mr. DICKINSON. Would you yield? We are about to run out of time here. Are you going to be available after lunch or did you plan to leave?

Mr. GARDNER. Sir, I can be available as long as you would like to talk.

Mr. DICKINSON. We have a regular meeting starting at 10, but I did have some other questions that I would like to discuss with you if you could be available.

Mr. GARDNER. I certainly can.

Mr. DICKINSON. I would appreciate it.

Mr. GARDNER. Yes, sir.

Mr. PRICE. Mr. Stratton.

Mr. STRATTON. Mr. Chairman, if I could reclaim my time that I passed up, Mr. Gardner, you talked about the Soviets [deleted].

Would you elaborate on that a little bit as to what that involves?

Mr. GARDNER. Well, in this country we have not attempted in any comprehensive way to make ourselves more difficult to attack by what had been identified as passive means. We have not in gen-

eral attempted to harden our military installations. We have not made very extensive use of mobility [deleted].

The Soviet Union has made considerably larger use of those techniques. For example, in the hardness area, they have built what we believe to be hundreds of underground hardened bunkers for their military and civilian leadership.

[Deleted.]

Now the other thing to appreciate is that these passive techniques act in such a way so they can be multiplied. Their effectiveness is multiplied if you combine them with active defenses.

We attempted to use those same kinds of multiple techniques. As a matter of fact, when we looked at the active defense of a deceptive based MX back a number of years ago, and I don't know if you recall it, Mr. Stratton, but we looked at deploying MX, 100 MX, in several thousand deceptive, deceptively in one of several thousand different places, and we found that even a modest defense could increase the attacker's price for attempting to destroy MX by severalfold, so the combination of passive defense techniques, particularly deception, and active defenses works very well together. It is a multiplitive effect rather than an additive effect.

Mr. STRATTON. Thank you.

Mr. DICKINSON. Would you yield?

Mr. STRATTON. Yes.

Mr. DICKINSON. Mr. Chairman, I discussed with Chairman Aspin the possibility of coming back this afternoon, and I don't know how many would be interested in pursuing this besides myself, but if you would be available at 2, if the members would be interested, we would meet back here, we could go forward in a formal session or just informal session for anybody that would like to come back, if they have any questions, so Chairman Aspin has said that is agreeable to him, and so if you would, meet us back here.

Mr. GARDNER. Yes, sir. I will be here.

Mr. DICKINSON. We only have 5 minutes to ask questions and then we are done, so we can go around again.

Mr. STRATTON. We ought to set a time for that.

Mr. DICKINSON. Two o'clock.

Mr. STRATTON. Two o'clock.

Mr. PRICE. Mr. Hunter? Mr. Badham?

Mr. BADHAM. I have no questions at this time.

Mr. PRICE. Mrs. Holt.

Mrs. HOLT. Thank you, Mr. Chairman. Mr. Gardner, when you were talking about the areas of responsibility, you pointed out that some of the Army ballistic missile experts were going on supervising the contracts, the ones that they would be involved in.

Mr. GARDNER. Yes.

Mrs. HOLT. How many contract specialists are there in General Abrahamson's office? In other words, are all these people constantly under the supervision of General Abrahamson through contract specialists?

Mr. GARDNER. Yes. General Abrahamson's organization is, has been established to contain as I recall approximately a hundred people this year.

We are on our way toward being an organization of that size now, of course, and so it is that organization's responsibility to

ensure that the program is properly executed in the diverse locations. At Huntsville as I recall there are something like 600 to 700 people, technical people, involved in the management of that portion of the program.

In space division out in Los Angeles, of course, there is considerably more than that, several thousand people in space division, but of course not all of them involved in this program.

Mrs. HOLT. I guess my concern is, Is anybody coordinating all of this information? How do we get it all together in order to make any progress?

Mr. GARDNER. That is General Abrahamson's responsibility and the roughly 100 people that are involved in his organization here in Washington, DC, of which I am a member.

Mrs. HOLT. Will that be adequate to really do it? Do you feel that we could do it?

Mr. GARDNER. Well, we believe that it is. It is minimally adequate. We are expecting that the size of his organization will expand to something like 150 to 180 people within the next year or so.

Mrs. HOLT. Are all the 100 contract specialists, are they technical people?

Mr. GARDNER. In general, we are technical management people, so we are, we have to both understand the technical issues involved in this problem and I guess that is primarily—as well as to understand how to construct responsible programs for the solution of, resolution of those technical issues.

Mrs. HOLT. I am not quite sure what your answer was. Are you contract specialists or are you not contract specialists?

Mr. GARDNER. Well, I consider myself to be a technical person that understands contracts well enough to lay out a technical program responsibly.

Mrs. HOLT. The answer would be, you are a contract specialist?

Mr. GARDNER. I believe we are both.

Mrs. HOLT. Thank you.

Mr. PRICE. Mr. Spence.

Mr. SPENCE. No questions, Mr. Chairman.

Mr. PRICE. Mr. Courter? Mr. Ray? We will move on. The witnesses will be excused until 2 o'clock and then we will come back.

Mr. GARDNER. Thank you, Mr. Chairman.

[Following a brief recess, the committee proceeded to the consideration of pending legislation.]

AFTERNOON SESSION

The committee met in executive session, pursuant to call, at 2:10 p.m., in room 2118, Rayburn House Office Building, Hon. Samuel S. Stratton, presiding.

Mr. STRATTON. The committee will come to order.

Mr. Gardner, we appreciate your coming back. The luncheons may have taken a little too much time, but I would hope that more members will be coming back, and I assume that they will.

Mr. Dickinson, you have some questions, so we will proceed with your questions.

Mr. DICKINSON. Thank you, Mr. Chairman.

Mr. Gardner, last year, let me see if I have got the figures here, but anyway we reduced the SDI requested amount not too substantially.

Mr. GARDNER. Mr. Dickinson, I think that it was about 20 percent.

Mr. DICKINSON. About 20 percent.

Mr. GARDNER. Almost 21 percent.

Mr. DICKINSON. All right. Now this year, this year we are faced with a whole different picture. We started out with a $3.74 billion, I believe, request. Then the House reduced this to $2.5 billion approximately.

Mr. GARDNER. Yes, sir, approximately.

Mr. DICKINSON. All right. Which is like $1.2 billion that we reduced. So it stands now at roughly $2.5 billion. Now it is our understanding that there is going to be an attempt now to put that—I think our chairman, Les Aspin, is going to suggest a further cut of $1.9 billion. Was that not in a letter that he circulated, to $1.97 billion?

Mr. STRATTON. There were some rumbles of other members of the committee to try to match the figure that the Senate went to of $2.9 billion.

Mr. DICKINSON. Was that $2.9 or $1.9 billion?

Mr. STRATTON. That is $2.9 billion.

Mr. GARDNER. The Senate has settled on $2.9 billion, sir, as we understand it.

Mr. DICKINSON. So that we can have a better feel for it, tell us what did we do to you last year when we made that 20-percent reduction, did that slow you down or kill some parts of what you are doing, and tell us what this $2.5 billion figure will do for you; then if we go down to $1.9 billion, what that will do for you?

Mr. GARDNER. Let me see if I can do that.

Mr. DICKINSON. So we will know how seriously we are hurting the program.

Mr. GARDNER. Right.

Mr. DICKINSON. What we can live with or not.

Mr. GARDNER. Last year when the budget request was ultimately reduced from our requested value of about $1.8 billion down to the authorized value of $1.4 billion, that $400 million cut was detrimental to the program, of course, but we were able to take advantage of the fact that we were just starting a number of programs.

Mr. DICKINSON. Excuse me.

Mr. GARDNER. Yes.

Mr. DICKINSON. For the benefit of the members just coming in, Sam was kind enough to recognize me to continue questioning. And the question that the witness is now answering is they received a 20-percent reduction last year in 1985, and now looking at the proposed reductions of $3.7 to $2.5 billion this year, and then maybe even a $1.9 billion, I am asking him to comment on what it did to them last year and what it will do this year.

Mr. GARDNER. Let me start that then. The reduction from $1.8 to $1.4 billion was a reduction that we attempted to manage our way through by essentially two processes. One was to delay some experimental programs that we were in the process of getting started with a few months, so that we could get them out of fiscal year

1985 and into just beginning in 1985. So that the bulk of their funding would begin to hit in 1986.

So we delayed these programs in order to stay within our 1985 budget. What that has done, of course, is that we have initiated a number of programs which then if they are allowed to follow their natural and most efficient development, it would call for a significant buildup in expenditures during 1986.

And it is on the basis of those plans that we made our budget request of $3.7 billion. If the budget is reduced from $3.7 billion to approximately the $2.5 billion number that you described, it is going to cause us to confront some very painful questions on the program. We will have to in some cases delay these programs significantly, 6 months to a year.

The programs that would tend to be delayed, we would have to choose between the major expenditures that are going on in advanced technologies that I have described and the expenditures that are going on for those advanced technology efforts that are more component and subsystem developments.

So it would cause us to have to either give up some of our advanced technology efforts, or delay our nearer term experimental programs, those that would provide us options for expenses more quickly.

So we very much believe that following either of those two paths would be very detrimental to the program. If the program is cut beyond $2.5 billion down to $1.8 or $1.9 billion, I think that the entire structure and objectives of the program would have to be reexamined.

Because there would be some question as to whether you could actually retain a viable program leading toward an ability to defend ourselves against ballistic missiles. The program would be sufficiently defocused, and its major technical character would be sufficiently changed that I think that we would have to go back and reexamine the fundamental premises within which the program is being structured.

Mr. DICKINSON. My time has expired.

Mr. DANIEL. Mr. Chairman, without objection, I yield my time to Mr. Dickinson, so that he can continue with that line of questioning. I think that it would be most beneficial to the committee.

Mr. DICKINSON. Thank you, thank you very much.

Well, you really did not say anything with a serious impact until you got to that last part. You are saying that because of the 20-percent cut last year that it just delayed some things that you wanted to do, and you added them back in this year.

That by cutting back to $2.5 this year, then that is going to cause some serious problems but something that you can live with.

Mr. GARDNER. Let me give you an example of the kind of thing.

Mr. DICKINSON. Yes, please do.

Mr. GARDNER. That we are going to be confronted with a $2.5 billion program.

Mr. DICKINSON. All right.

Mr. GARDNER. At the current time, we have efforts going on in, for instance, directed energy weapons technology, a number of efforts going on in parallel. We have research going on in several different kinds of lasers, eximer lasers, free electron lasers, and x-ray

lasers as well as research going on in neutral particle beams and charge particle beams. There are several different technical areas.

At this time and with the technical information that is available, we do not know which of those ways is best. So we have laid out a program to examine each of them with the intention that as technical results occur to make a prudent narrowing of our objectives based on technical results.

Confronted with the $2.5 billion program, we will have to begin to make arbitrary decisions in order to stay within the funding bounds. We will just have to consider the possiblity of dropping out major research areas simply because we cannot afford to pursue it. So it will cause us to drop areas of research.

Mr. DICKINSON. If you go below $2 billion, what?

Mr. GARDNER. Well, if you go below $2 billion, what we are confronted with is having to probably confront eliminating major experimental programs that are central to this program. For example, we have nonnuclear interceptor programs underway, demonstrations of those, and major sensor demonstration programs underway.

We would have to abandon, I believe, several of these key programs which would leave us with I think an inability to——

Mr. DICKINSON. Well, I understand. Let me ask you two other quick questions before my time runs out again.

How confident are you of the information on which you were basing your Soviet assessment this morning?

Mr. GARDNER. We are quite confident of that information. I have with me Dr. Sellers from the DIA.

Mr. DICKINSON. That is not necessary. I just really wanted to know your degree of confidence in what you were telling us this morning, was it to a high degree speculative or a mix, or you really think that we know what we are talking about?

Mr. GARDNER. I believe that we know what we are talking about; yes, sir.

Mr. DICKINSON. All right. Now when you talk about lasers firing its beam and so forth, is this a multiple shot type of a weapon system, or is it one tremendous burst of energy that after it is expended that it will take some type to rebuild and recharge?

Mr. GARDNER. Which?

Mr. DICKINSON. Any of them. Are we talking about something similar to a machinegun that can fire repeatedly until it hits a target, or is this one blast, and you better hit it because it is not going to charge again for a long time?

Mr. GARDNER. [Deleted.] Its firing capacity would be more dictated by what is in effect the size of its fuel tank than anything else.

Mr. DICKINSON. All right. Now I talked at length with Dr. Teller at one point. And he was not giving me a classified briefing, but this was his own concept, and I know that he has talked to you about it.

Mr. GARDNER. Yes, sir.

Mr. DICKINSON. [Deleted.]

Mr. GARDNER. [Deleted.] That is so because most of the lasers use sources of power that themselves are capable of being continued in operation. A chemical laser operates very much like a liquid

rocket. So you can run the rocket as long as you have fuel tanks to do it.

[Deleted.]

Mr. DICKINSON. Thank you. My time has expired again. I thank the gentleman for yielding.

Mr. STRATTON. Mr. Sisisky.

Mr. SISISKY. Does the gentleman desire any more time?

Mr. DICKINSON. I do not want to monopolize time. I have several more questions.

Mr. SISISKY. I just want to ask a question. I just came from a debate between Richard Perle and a guy by the name of John Pike.

Mr. GARDNER. Yes.

Mr. SISISKY. And everybody was picking on Richard Perle but me. I do not know why I all of a sudden became a defender of Richard Perle.

Who does he represent, would you mind telling me, where does his expertise come from?

Mr. GARDNER. John Pike?

Mr. SISISKY. Yes.

Mr. GARDNER. John Pike is a member of the Union of Concerned Scientists, I believe. I personally have debated John on a number of occasions on these subjects and know him fairly well. He is trained and technically trained. And I believe that he is on the staff of the Union of Concerned Scientists. I am not positive of that.

Mr. SISISKY. I asked him this question. He did not say that we should not do some research. He was talking about the amount of money. So I said you are an expert in the amount of money, how much money do you think that we ought to spend. If we are talking about the President's request for $3.7 billion, or the Senate at $2.9 billion, or the House Armed Services Committee at $2.5 billion, and now the amendment of $1.9 billion. Tell me what the real amount of money is, and why you know more than everybody else knows.

And he said that it should be less than that. Because the other things that you are doing in the program violates the SALT II Treaty. I said for instance, do you really believe that it is violating the SALT II Treaty, and he said yes.

Do you believe that they are violating the SALT II Treaty with all of the other research you are doing in there?

Mr. GARDNER. I think that the answer is a clear no, we are not violating the ABM Treaty, and we have no intention of violating the ABM Treaty, and John Pike knows that.

We are allowed by the treaty to conduct research in technology developments. We have gone through in some excruciating detail the technical contents of the program to ensure that it did not violate the treaty. In some cases, there were areas in which the program did have gray areas in it, and we adjusted the program to stay out of those regions intentionally.

We have had the program reviewed by independent members of the Department of Defense who are charged with these responsibilities, among them the general counsel. And there is no question that the program is in compliance with the ABM Treaty.

What people are more concerned about, and I believe what John Pike is actually coming toward, is that ultimately if our research is

successful and we choose to develop and deploy these defenses, we will have to modify that ABM Treaty. And there are some people who feel so strongly about that that they are crying wolf now in essence before the fact.

Mr. SISISKY. Thank you. I will yield the balance of my time to Mr. Dickinson.

Mr. DICKINSON. I do not want to monopolize the time, please. Thank you. I do have some more questions, but I have taken 10 minutes.

Mr. STRATTON. Mr. Courter.

Mr. COURTER. Thank you, Mr. Chairman.

Mr. Gardner, I enjoyed very much, and I have heard it before, your testimony, and I certainly enjoyed it today. I thought that it was excellent. And I want to congratulate Sam Stratton for initiating this hearing.

A lot has been said about the levels of funding. In fact, when I was coming in, you were basically answering that question. I have spoken to a lot of people involved in the SDI program. And it has been told to me, and I am not sure what numbers he used, but it has been told to me that if the President had not had his March 23, 1983 speech which resulted in the Fletcher Commission and resulted in the unification of the effort in all of these various disciplines and bringing them under one tent, that the level of funding, the normal growth in these areas, and sensors are important in lots of areas besides SDI, and lasers are important in lots of areas besides SDI, and we were doing a lot of this research and it was called something else, that it has been told to me that if attention had not been brought to the SDI Program by the creation of the office and Congress had ceded to the requests of the administration and the budget growth in these various isolated disciplines, that we would be spending for 1986 under a program designed let us say for a 5-year budget of 1982 and 1983 approximately $2.4 billion.

And my question to you is, is that about correct; and if not, can you give us any figures as to what we would be spending if there was no attention brought to this program in the normal course of things, do you follow what the question is?

Mr. GARDNER. Yes; I do, indeed.

Mr. COURTER. All right.

Mr. GARDNER. Let me try to go through that. One of the things that we did as a part of the Fletcher Commission was to attempt to understand that research base that was going on in these technical areas that you described. It was a difficult thing to do, but we managed to accumulate we believe fairly good statistics on what was intended.

We went through a process of separating out the research that really could be applicable to this problem from that that was not. When we finished that process, we toted up the amount of money that was planned to be spent between 1985 and 1989, and the estimates were that between $12 and $15 billion was planned to be spent during that time period, and approximately $1.5 billion was planned to be spent in fiscal year 1985, the year that we are in now.

And the programs were generally ramping up from that point. And certainly, in 1986 if the average is on the order of $12 to $15

billion, your number of $2.5 billion certainly must be close to correct.

A significant amount of research was planned to go on. Sensors is a good example. Already included in the Department of Defense plans were technical programs to build new next generation tactical warning and attack assessment sensors, for example. Several billion dollars was included in the program to be able to conduct that.

We concluded that the research and technology development, for instance, in that area could serve double duty. That we could by relatively simple modifications to that program configure it in such a way that we both satisfied the tactical warning requirements as well as satisfying the ballistic missile defense requirements. And we in fact have laid out a program exactly of that kind.

And we have begun programs, for example, in that area, both in that area and in space surveillance is another example.

If we are confronted with a budget below $2 billion in fiscal year 1986, we are going to have great difficulty continuing those programs at the pace that they were intended to proceed prior to the initiation of this program. So we will have cut back the program beyond what it was previously intended without any consideration to ballistic missile defense or with little to no consideration of ballistic missile defense.

Now, I think it is important to understand just how significant this is. In the case of tactical warning and attack assessment satellites, for example, and in the case of space surveillance satellites, those are two classes of satellites that are very important to our entire strategic posture.

We are coming to the end of our ability to get adequate performance out of the existing satellites. They were designed a number of years ago. They have been upgraded. And there is need for new, more survivable satellites to be built. And so our program is doing the research to be able to do that.

We also have need for space surveillance to allow ourselves to know when potential ASAT vehicles lift up in an attempt to destory our satellites or when they are orbiting in to attack our satellites. So we need space surveillance capabilities.

Both of those programs the technology developments for them are included in our program. And that is an example of the kind of double duty we are trying to get out of these technology programs and the kind of major initiatives that we would have to either delay significantly or, if the budget is cut low enough—below $2 billion would be entering that region, I believe—some of those major needed programs would have to be sacrificed.

So it is a budget at less than $2 billion is a very serious blow to the program, not only to the Strategic Defense program, but actually to the broader technology developments that are included in it.

Mr. COURTER. My time is up. But that is fascinating. I thought that is what the answer would be, in fact I knew that is what the answer was.

And I am just wondering—well, my time is up. But thank you, Mr. Chairman.

Mr. STRATTON. Mr. Hopkins.

Mr. HOPKINS. Mr. Gardner, let me ask you this question. Figures seem to be ratcheting downward for SDI. And certain things that a scientist would like to do seem to be about to be sacrificed. If money were not the object, looking through the other end of the telescope, not being wasteful, continuing to be prudent, as a scientist, how much money would you need to perfect it?

Mr. GARDNER. We, the defensive technology study team, which was an accumulation of the best scientists we were able to bring to bear on this question, did lay out that exact—lay out their best answer to that question. In fiscal year 1985 they said that we could usefully spend about $2.6 billion.

Mr. HOPKINS. And that would be sufficient?

Mr. GARDNER. In fiscal year 1985.

Mr. HOPKINS. Yes, sir.

Mr. GARDNER. Now, what we are actually spending in fiscal year 1985 is 1.4.

They identified what they described as a fiscally constrained program in fiscal year 1985, which was the $1.8 billion. So the actual first year of the program was lower than the most fiscally constrained program that was identified as a part of the Fletcher Commission.

If you look at outyears, of course, the Fletcher Commission estimated that expenditures in fiscal year 1986 of more than $4 billion would certainly be warranted based on the technical initiatives that they found. So we are actually requesting less funds than was identified in an aggressive program that was technically constrained, which was the way it was described in the Fletcher Commission.

So we have started the program off in a very fiscally constrained way.

Mr. HOPKINS. What are your totals? What would your total figure be? I am not sure I got all your figures on it.

Mr. GARDNER. The Fletcher Commisson recommended that approximately $26 billion could be spent in fiscal year 1985 to 1989 in a technically constrained program, that is, pursuing the initiatives as they appear to exist.

They also identified as fiscally constrained program at about $20 billion during the same time period.

Mr. HOPKINS. What you are saying to me, the Fletcher program says that they could do it for $26 billion from 1985 through 1989?

Mr. GARDNER. That is correct.

Mr. HOPKINS. What do you have currently now figured in?

Mr. GARDNER. Our current estimates, given the way in which the program has been started, are about $23 billion. So we are—the program has been delayed and it is funded at something less than the technicaly constrained level identified by the Fletcher Commission.

Mr. HOPKINS. So if you have $26 billion that they asked for or feel like is required to do a good job and you now are at $23 billion, does that take into consideration the figures that we are now debating?

Mr. GARDNER. No, it does not.

Mr. HOPKINS. So there would be a further reduction from the 23, is that correct?

Mr. GARDNER. That would be a further—that's correct.

Mr. HOPKINS. Let me yield to the gentleman from New Jersey.

Mr. COURTER. Thank the gentleman for yielding.

Robert Jastrow, who has written prolifically on the subject of SDI, was here in Washington yesterday, I guess you know.

Mr. GARDNER. Yes, I do.

Mr. COURTER. And I was honored with his coming to my office for about 1½ hours and we talked about a number, a multitude of things.

It is his contention—and I just wanted to bounce this off you to get your opinion—it is his contention, among other things, that within a relatively short period of time that using off-the-shelf technology, that would be kinetic energy weapons, guided projectiles, smart weapons, that we could build, using present day technology, guided projectile SDI, two phase, launch phase and point defense, and that each phase would be possibly 80- to 90-percent effective.

Do you agree with that? Using the technology that we have today and smart projectiles can we deploy a two-layered defense system?

Mr. GARDNER. Well, we believe that the technology that you have described that Dr. Jastrow has identified, is the most promising near-term technology that we have identified that has been—that exists. We think that it is promising that you could build, relatively near term, effective defenses using that technology, particularly against the missile systems that the Soviet Union is building now and deploying now.

We believe that those defenses could be multilayer and could be, could have performance against existing threats that would be quite high in terms of its effectiveness. And the numbers that you quote from Dr. Jastrow certainly should be in the ballpark.

We think that if we were to undertake such a program as that that we should have available to us and working in the wings more advanced technology that you could use to augment that kind of a defense such that if the Soviet Union reacted in the most technically aggressive way that the defense system would still be able to handle that most aggressive response with the introduction of this more advanced technology.

So that is fundamentally the way we feel about it.

Now, some of that kinetic energy weapons technology has not been completely proven. And included in our program are the key major experiments that are required to prove beyond a shadow that those technologies can actually do what we now believe they can do.

So it is one of, that is one of the reasons we feel so strongly about the major experiments that are included in the program. Some of the language that we have heard being considered for inclusion in bills applied to SDI could seriously constrain our ability to demonstrate that that technology actually exists. The language seems to be aimed at removing from us the ability to demonstrate the technologies that we believe are most promising.

For example, the Army has a program called the Airborne Optical Adjunct. This is a program that is quite far along. It is a program that I alluded to this morning that includes major experi-

mental tests of large, high performance optical sensors capable of surveillance and tracking against ballistic missiles that threaten both ourselves and our allies at long range. It is building block technology. It is key to both ours and our allies' defenses. Those experiments are planned for initiation, initial testing in the [deleted] timeframe, close, close by, close at hand.

Equipment is being designed. Experiments are being configured. Aircraft are being modified. There is some possibility that language would be written into this bill that would prohibit us from doing those tests. The reason for doing that I find hard to understand. It is our most promising, near-term technology. And in order to understand and demonstrate its veracity we need to be able to conduct those experiments in a realistic fashion.

The same thing is true in other experimental regions as well. This nonnuclear, precision guided interceptor technology has a number of different configurations possible for it and we have several major experimental programs underway to demonstrate that technology.

So as our budget is cut it forces us to drop or delay those tests of those, of that near term, that most promising near term technology. And I personally find it hard to understand why it is in our best interest to do that.

Mr. STRATTON. Mrs. Lloyd.

Mrs. LLOYD. Thank you very much, Mr. Chairman, Mr. Gardner. I appreciate your being with us today. And I am sorry that I could not be with you this morning.

I think you know that I am very supportive of SDI. The SP-100 has been funded through my Subcommittee on Science and Technology. I really do not think—I think you have given the Union of Concerned Scientists a new lease on life. I do not think they have had so much fun since the days of Clinch River. And I think they are going to have to really be prepared because I think they are going to have a terrific onslaught on the program.

My question is in the budgetary discussions the $1.2 billion which we cut out of the SDI program, did this basically cut the kinetic energy research program?

Mr. GARDNER. We don't know exactly what we are going to have to cut out of the program, frankly, at these lower funding levels. We are attempting to understand where our highest priority programs are. Certainly if we see the kinds of budget reductions that have been alluded to, for example, amendments below $2 billion, there will have to be major changes to the program.

I cannot at this stage in the game give you a specific answer as to whether or not the SP-100 program would be cut, but I would find it likely that most programs would suffer to some extent or another. And——

Mrs. LLOYD. But it would not be a general area of cuts, but it would be the overall program?

Mr. GARDNER. Well, we of course are hoping that whatever the situation in terms of the way in which the program is cut that we are allowed the flexibility to be able to rebalance the program the best that we can in the face of the funding reductions that we are forced to suffer. So we would like to retain the flexibility to refocus the program if it is cut.

The question of whether or not, what we would do with this particular program is hard for me to say at this time.

I am not sure that I have answered your question exactly but I'm——

Mrs. LLOYD. I had heard different reports, that is why I asked you.

I do not think we have ever had a program that was still in the laboratory that has really offered so much to not only for our safety but the entire free world's security, but I have never seen a program that has created such diverse reactions, either wholehearted approval or complete disavowal of the program.

It seems to me that there is a middle ground that I would like for us to look at, that if we could preclude the area of surprise attacks, for instance, we would say, "Hey, you know you can't come down in New York City. You can't come down on a command control area," that this might be more within our reach. Would you comment on that?

Instead of providing an entire blanket.

Mr. GARDNER. Right. It is true that this program has, it touches nerves in a number of different directions. And I attempted to describe this morning, at least in a top level sense, some of the reasons why I think that is so.

What we think that we can do is move from a situation where we find ourselves now where we are completely vulnerable and can only rely on essentially retaliation for our safety in this nuclear world.

Mrs. LLOYD. That's correct.

Mr. GARDNER. To one in which we take advantage of a combination of defensive capabilities as well as offensive forces for our safety. And we think that initial defenses could be deployed that would considerably strengthen our deterrent posture, make it much more uncertain for an attacker to actually attack us, at relatively modest performance levels on the part of the defense.

We are in the process of trying to congeal our understanding of that problem. But it does appear that relatively moderately capable defenses can significantly improve our deterrent posture. And being able to defend, for example, things like our C^3 control links are the kinds of things that those kind of intermediate defenses could certainly do.

Mrs. LLOYD. It would seem to me if we could inject this air of uncertainty knowing that they could not completely annihilate our systems would certainly be worth the cost of the program.

Mr. GARDNER. We certainly believe that is so.

Mrs. LLOYD. And it seems to me we would have a much easier job—I could be wrong—in selling the program.

Thank you very much for your time.

Mr. GARDNER. Thank you.

Mrs. LLOYD. Thank you, Mr. Chairman.

Mr. STRATTON. Mr. Darden.

Mr. DARDEN. Thank you, Mr. Chairman.

Mr. Gardner, I guess at this point in the day most of the questions in which I was interested have been already asked and responded by you in a very proficient manner. But you have probably

already covered this area before sometime during the day. I have been in and out.

I am interested in the allocation of the various amounts of research between, the layout between private industry, our own military facilities and so forth. Would you briefly summarize what percentage of the funds are allocated in contracts, allocated to the various components working on SDI?

Mr. GARDNER. I can do that. Let me try to do that in a number of different ways.

One way of looking at the program is to break it into pieces of effort according to the size of the experimental program that is underway. And this morning I attempted to do that by identifying a category of programs that included major experimental, major experiments. And we have about 35 percent of fiscal year 1986 budget intended to go in major experiments. About 5 percent of the budget is going into very advanced research projects, what you might call far out research, areas in which you don't know exactly what the payoff is going to be but it looks promising.

And the bulk of the program and the remainder, which is about 60 percent of the program, is going into component developments and advances in what you might call the lower tiered experimental levels, things like building high performance sensor components, building higher performance missile components, pursuing alternate sources of power for lasers and direct energy weapons, essentially component research and technology development.

So that is one way to look at it, in terms of the classes of technical effort.

Another way you can look at the program is in terms of the way in which it is administered programmatically. And, for example, the program in fiscal year 1986 is about, oh, as I recall, about 35 or 40 percent of the program is managed through the Army's Ballistic Missile Defense Agency in Huntsville, AL. Another equal fraction, 35 or 40 percent, is managed through the Air Force's space division. Lesser amounts of the program are handled for us by the Defense Intelligence Agency—the Defense Nuclear Agency and the Department of Energy laboratories. And some moderate amount of it is actually administered directly by the strategic defense central management organization itself.

So that is another way of looking at the way in which the program is managed technically.

Mr. DARDEN. What about the allocation though between Government or private contractors as opposed to Government labs?

Mr. GARDNER. Well, almost all of the work is actually being accomplished by, well, by far the large fraction of the work is being accomplished by private institutions, either private industry, large corporations, or small research corporations, or the university research laboratories.

Mr. DARDEN. All right. Now, could you give me some rough, very rough percentages of allocation between private industry, between universities and so forth? Is that data available?

Mr. GARDNER. I think the data is available but it is not at the tip of my tongue. Let me give you that for the record just a little later if you don't mind. I can't, I can't off the top of my head give you that percentage that way.

Mr. DARDEN. All right, sir.

Mr. Chairman, I yield back the balance of my time or I yield to Mr. Dickinson, whichever.

Mr. DICKINSON. Well, look, it would be helpful, I think, if you would synopsize for the record what you would expect to apportion of the funds for Government research facilities, contractors in general, universities, and so forth. It gives the members a lot more parochial interest when they see it is going through their alma mater, for instance.

Mr. GARDNER. Yes, I certainly will do that.

[The following information was received for the record:]

Approximately 55% of the total SDI funds currently go to the private sector. Another 5% goes to universities. The remaining 40% is apportioned to government labs and organizations, which also contract out to the private sector. Consequently, the total for private sector will be approximately 70% of the total funding.

Mr. DICKINSON. Let me ask you a question. It is my time again. Have you heard of the World Defense Council?

Mr. GARDNER. Yes. Just recently I have heard of them. I am not——

Mr. DICKINSON. You are not familiar with what they are espousing?

Mr. GARDNER. No, I'm not. Not in detail.

Mr. DICKINSON. Well, they call them—I didn't have enough expertise to appreciate what they were telling me. And I had asked them to go talk to staff. But they, but I was wondering if they were, you know, substantial, well thought through people or—I'm describing it wrong—but if they were, you know, smart, scientific type people or fringe people that come into our office from time to time. But you really don't know what?

Mr. GARDNER. I would rather not——

Mr. DICKINSON. Well, I am not asking you to characterize them. I am just asking you if you knew them.

Mr. GARDNER. Well, we are in the process of meeting with them.

Mr. DICKINSON. OK.

Mr. GARDNER. And as a matter of fact we are going to have some discussions with them. And I would expect that——

Mr. DICKINSON. Good.

Mr. GARDNER [continuing]. After we have those discussions we would be in a better position to answer that then than I feel right now.

Mr. DICKINSON. That would be helpful to us too.

Mr. STRATTON. Would the gentleman yield?

Mr. DICKINSON. Sure.

Mr. STRATTON. Is that a Lyndon LaRouche operation?

Mr. GARDNER. I don't believe so, sir.

Mr. DICKINSON. I don't think so, but it might be.

Mr. STRATTON. They have some signs in the airport supporting lasers. And these guys come in under all kinds of names.

I had a request to speak to the Schiller Institute. And this sounded like a high level intellectual organization. It turned out it was one of the LaRouche arrangements, so——

Mr. GARDNER. We are fairly sensitive to that. And I don't believe this group is associated with him.

Mr. STRATTON. Thank you.

Mr. DICKINSON. Let me ask you one other one. What contributions—Mr. Darden asked you about some apportionment between our Government facilities, contractors in general, and universities, and those three in particular. What are we looking toward our allies as doing? What part of the action will they have? Are we going to pay them? Or are they going to on their own get into this business and develop their own research and development in conjunction with us? How are they players?

Mr. GARDNER. Right now what we are attempt—what we have underway is a series of what are in effect bilateral discussions between ourselves and our allies with what is in effect two things going on. One is us describing to them the major technical plans for the program that we foresee and then with the expectation that they will discuss with us what they believe are their technical abilities to contribute to that program.

Mr. DICKINSON. If we pay them?

Mr. GARDNER. And right now what we are looking toward is searching for ways in which we can get some portions of this program executed by technically competent capabilities in their country.

Now, we would——

Mr. DICKINSON. Yes, but who is paying for it? That is what I am trying to ask you.

Mr. GARDNER. At this stage in the game we would expect that some of the research that we are intending to fund here we would fund through organizations that our allies—through the technical organizations of our allies.

Now, we also——

Mr. DICKINSON. Are you saying in a nice way that the United States is going to fund it all?

Mr. GARDNER. Well, we don't believe that we will fund it all. No, sir. What we believe is that we might very well fund some portion of it. And what we are attempting to determine now is what kind of work they can do and what sort of investments we and they should make in areas of their—of our mutual interest.

Mr. DICKINSON. Well, if we go forward with the SDI and it is successful the SDI in toto will be defending all of our allies, will it not?

Mr. GARDNER. That's correct.

Mr. DICKINSON. And so they all join, share the benefits of it and are under the umbrella of its protection?

Mr. GARDNER. That's correct.

Mr. DICKINSON. So I would have some very strong reservations, as I am sure others in the Congress would, if it turns out we are funding 90 percent of all of this with the deficit that we are facing and to put an umbrella over all of our allies and friends in the world and they are just along for a free ride.

Mr. GARDNER. I understand. I understand, sir, what you mean by that.

Mr. DICKINSON. And it is very difficult to get any sort of answer either from you or from Cap Weinberger whom I asked yesterday, or whatever, as to what we are looking for them to do. And you say we are exploring that.

Mr. GARDNER. Well, the reason that I don't believe anyone can answer you now is that we don't know, number one, what they are capable of doing. And we also don't know what we—we have not yet decided what we want to ask them to do.

Mr. DICKINSON. Yes. Well, I understand

Mr. GARDNER. Once we find that out.

Mr. DICKINSON. Let me ask you one final question then I will subside.

I alluded to this this morning. We have been, I have been talking to Danny Graham and the High Frontier people I don't know for how long, never have understood it, and it seemed so far out that I just really did not have time to study it. But we have been told by some people on the staff, some other people in whom we have a lot of high regard, that that is so far out, that charged particle beam business, that is just space talk and Buck Rogers. And now you said this morning, hey, well we did not know 10 years ago that there was such a capability really feasible but now we believe that it is. Has the High Frontier been right all along and we have been wrong and we are just now recognizing that, hey, he has got something after all?

Mr. GARDNER. That is a touchy area. But let me try to describe what I think are some of the things that the High Frontier has said.

Most recently, and by most recently I mean within the last 2 or 3 years, what they have advocated, as I understand it, is the use of kinetic energy weapons to defend ourselves. They, as I understand it, some considerably earlier time when General Graham was associated with the DIA. and I think he was the director of the DIA, he saw some evidence of these Soviet direct energy weapons programs. I don't believe that he was—specifically identified strictly charged particle beams but I think that was only one of a class.

Mr. DICKINSON. Well, this is one of them.

Mr. GARDNER. One of a class.

Mr. DICKINSON. One of a class that gets into the High Frontier concept.

Mr. GARDNER. Right. Now, I think what we are finding is that these directed energy weapons can be, there is a potential that they can be used to defend against ballistic in a number of different ways. And the research on them is expanding rapidly. And we are finding an ability to do things, it looks like, that we never thought we could do before.

Let me give you an example. Just as early as a year ago the consensus of the scientific community was that charged particle beams were only capable of being considered for deep terminal defenses, defenses right close to the ground, and that these charged particle beams could only transmit their beam over a few kilometers of range. That was the consensus of the technical community. And I do not believe you could have gotten any reputable scientist anywhere to argue with that.

Well, in the last year we have found that there is another scientific mechanism that can be used with charged particle beams that changes that dramatically. The procedure is a complicated one, but conceptually it is not that difficult to understand.

[Deleted.]

Now, that is something that 1 year ago no one would have believed that you could do. And it is something that has been demonstrated to be capable of being done in ground tests at Livermore Laboratories just a few months ago.

Mr. DICKINSON. Well, my time is up.

Mr. GARDNER. So the technology is moving rapidly.

Mr. DICKINSON. But I think, I think Danny Graham is looking better all the time.

Mr. GARDNER. Well, he is not looking too dumb, no, sir.

Mr. DICKINSON. Thank you, Mr. Chairman.

Mr. STRATTON. Mr. Kasich.

Mr. KASICH. No questions, Mr. Chairman, I will yield to Mr. Courter.

Mr. COURTER. Thank you.

Mr. Gardner, there has been, you used the term, and it was interesting, consensus in the scientific community. And I think that is one of the difficulties with the public perception and the congressional perception about SDI. I think if you took a poll among Members of Congress on both sides of the aisle they would say the clear consensus of the scientific community is that it either is impossible, that it physically cannot work, not achievable, or that if it can be achieved it can be achieved at such an expense that the offense can always overwhelm and, therefore, why do it. That is one of the reasons, of course, not to go forward with it.

And I think that has been perpetrated by the Union of Concerned Scientists and others.

The question I have, and I know that with the floor debates coming up the week after next and the Senate debates that have occurred already there are accusations by people saying that there is not really a group of informed scientists that believe in the validity of the program. And they will start citing the Union of Concerned Scientists, 50 Nobel laureates who signed a petition saying it cannot work or it is too expensive or can always be overwhelmed and the offense will always win against the defense.

Can you comment on that? Are we making progress in the out-of-government scientific community? Is the Union of Concerned Scientists just a good P.R. group filled with a group of Nobel laureates who are not physicists, astrophysicists who perhaps are expert in other types of sciences and therefore we do not have expertise in this area but we, because of their titles and their awards, give them a great deal of credibility?

Could you comment on that area? you know, who is on our side here?

Mr. GARDNER. Well, I think that to a significant extent the picture that you paint is a correct one in that quite a large number, as I understand it, of the people that have expressed concern about the program are people that are not technically knowledgeable about the program at all.

An example of the different, of what occurs when people really get involved and attempt to understand what this program is about is the Fletcher Commission itself. I, being intimately involved in that effort and with a chairman that was intellectually neutral as far as I think Dr. Fletcher was, at the beginning of that effort, and there were 50 or 60 or the most knowledgeably scientifically

trained people in this area that we could pull together, in the beginning the consensus of that group, and we took in polls specifically to attempt to determine this, was that it was not likely that this was going to work out.

That was at the beginning of our 4-months effort on this program.

At the end we took another set of polls. And these were blind polls from the members of that Fletcher Commission. And the consensus of opinion was that it was promising that it was going to work out.

What had happened was that there had been a significant shift that occurred when people actually sat down and took a look at the calculations, at the experiments that had been run, and when they were intellectually honest enough to be capable of being persuaded by technical facts and calculations.

And I think therein of course lies a key point is to be capable of being persuaded.

Mr. COURTER. Continue, but just a quick question. Is that polling information available? That is the first time I have heard that. That is a very important piece of information.

Mr. GARDNER. These were informal polls.

Mr. COURTER. Informal.

Mr. GARDNER. But they were reported as a part of——

Mr. COURTER. The Commission report?

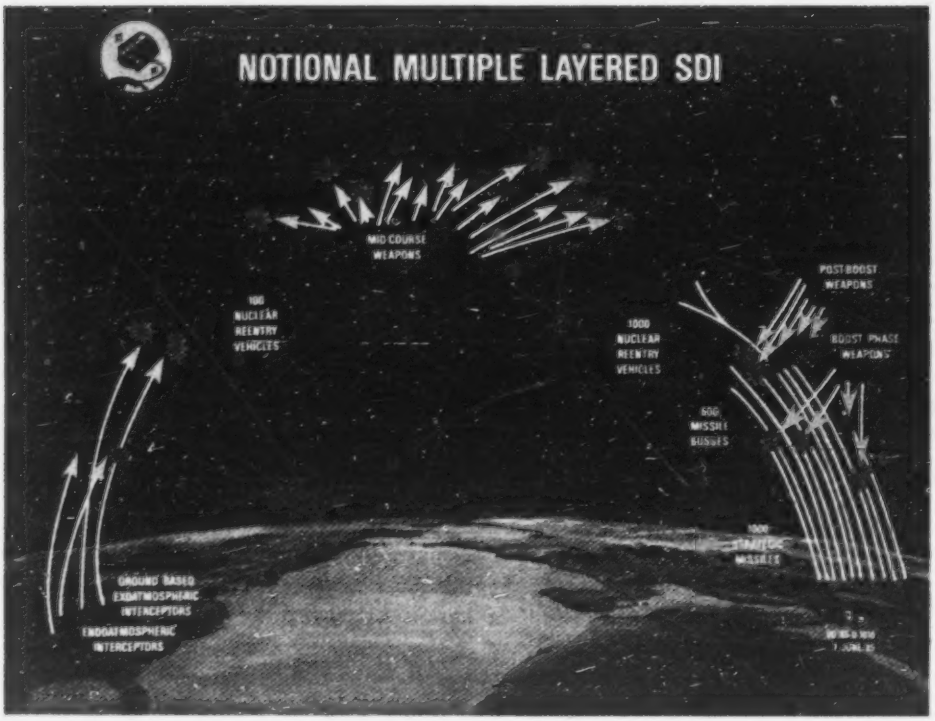
Mr. GARDNER. The Commission studies I think, and at least notes, the notes from that effort.

Mr. STRATTON. Would it be possible to get some copies of those polls, Mr. Gardner, because they might be helpful on the floor?

Mr. GARDNER. Let me see if I can find those. They were re—it was reported as a part of the reports of the Fletcher Commission to the Department of Defense in informal—in briefing material.

Mr. STRATTON. I have a couple of questions that I would like to ask. One question has to do with some of the things that we have been referring to. We are used to this jargon but I am not sure that I entirely understand it. For example, what is a mult—what is, when we talk about multilayered defenses what are we talking about? Are we talking about one line backing up another or it is some other sort of arrangement?

Mr. GARDNER. This is a concept that it is important to be able to understand. And let me try to describe it in a simple way.



And there is a chart that attempts to pictorially represent it. But the idea of multilayered defenses is simply to take, make repeated attempts to destroy ballistic missiles during various phases of their flight.

For example, pictorially shown there are four phases, are four phases in which a ballistic missile flight occurs. The boost phase during which time the rocket lifts up off the ground and it is accelerated to the velocity needed to carry it over to its target. And one layer of the defense would operate to attempt to intercept and destroy the ballistic missiles at the time.

If, for example, the defense, that defense layer were 70-percent effective it means that for every 1,000 missiles that lift, that were lifted off and launched, 700 of them would be destroyed and 300 of them would continue on their way into their next phase of flight, in this case the post boost phase.

Mr. KASICH. Can we interrupt as he goes through these phases and ask questions, Mr. Chairman?

Mr. STRATTON. Well, I think we ought to let him answer the question here. And then——

Mr. KASICH. The reason I say that is because I was just wondering what, what you hope to achieve at that percentage rate in the boost phase if you, as you go through, what would your goal be?

Mr. GARDNER. OK. Let me come back to that.

So, 700 of these ballistic missiles had been destroyed in that phase of flight in what we identified as the first layer. Three hundred others continue on their path.

Their next phase, their next phase of operations are the post boost phase. And that is the phase in which the ballistic missiles go

through a series of space, or maneuvers and drop off individually aimed re-entry vehicles to the separate targets that they are going toward. And let's say that there are 10 RV's on each missile, so each one of those post boost phase, post boost vehicles, so during that second phase if the effectiveness of the defense of the second layer is again 70 percent, then of those 300 missiles that entered into that phase, about 200 of them were destroyed and now only 100 of them are continuing along their way.

Each one of those 100 missiles had a number of re-entry vehicles associated with it. So in the third phase of the flight, of the defense, that is during the time in which these vehicles are coasting through space on their way to the target, a third layer of defense would occur and 70 percent of the remaining missiles would be destroyed in that phase.

So now, there would be only a few hundred re-entry vehicles coming down to their target from the thousands that had been initially launched. And that would be the third layer.

Finally, as the few hundred re-entry vehicles approach the atmosphere, the fourth layer of the defense would be activated and it would intercept the few hundred remaining re-entry vehicles.

So what has happened is a series of defensive operations, defensive engagements have occurred, each one destroying some portion of the attacking threat. And by the combination of all four of them operating together, the defense is able to accomplish its job.

Mr. STRATTON. In contrast to the ABM that was virtually a one-layered——

Mr. GARDNER. It was just a one-layer defense, yes.

Mr. STRATTON. Now, are we, we are not assuming, are we, that these layers are going to be laid out on the ground necessarily? They may be coming from above, is that correct?

Mr. GARDNER. That's correct.

Now, the defense, the actual defense systems themselves that accomplish these various intercept layers are found in different, in various locations. For example, for intercepts in that boost phase and post boost phase, the defense components almost surely will be found in space, will be orbiting in space. And when the ballistic missiles lift off they will essentially direct themselves to the ballistic missile and destroy it in those two phases.

For the midcourse operations we actually have a choice. And we would probably use two different ways of accomplishing the midcourse intercepts.

For some of the midcourse intercepts, those that are closer to the Soviet Union, we would probably also use space-based vehicles to intercept during that portion. For that, those portions, for the RV's that were not destroyed in the initial, in that early time, we could also launch missiles from the ground to make intercepts high above the atmosphere in the later portions of the flight.

So, the defensive components are, generally speaking, found either in orbiting platforms so that they are in close proximity to the ballistic missiles or back on the ground at the region where the attack was aimed, either in the United States in the case of defenses against—of the United States, or defenses colocated with our allies in that case.

Mr. STRATTON. I see. Thank you very much.

Yes, OK.

Mr. KASICH. Mr. Chairman, let me just ask a couple things.

That was just an excellent explanation of it.

What about the argument that some of our liberal friends say that if it gets into the reentry or the terminal phase and we take it out then, does that create horrible damage to us here if we take it out at that point or even in the midcourse phase? They say that it would destroy the Earth. And is that true?

Mr. GARDNER. We don't believe so. First off, we believe that almost—that during most of the phases of operation of the defense no nuclear detonations would occur at all.

For example, for all those missiles that were destroyed in either the first layer, the boost phase intercept layer, or in the second layer, the post-boost intercept layer, it would be un—it would be highly unlikely that any nuclear detonation would occur. The ballistic missile would be intercepted, it would be destroyed, it would fall onto Soviet territory, and no nuclear—the warheads would be highly unlikely to have been armed and no nuclear detonation would occur at all.

That same thing would be true for intercepts in the post-boost phase and we believe during most of the midcourse phase.

So in almost all of the cases no nuclear detonation would occur at all.

Now, as the targets, as these reentry vehicles carrying their nuclear warheads approach the target and start reentering into the atmosphere, which occurs at about 100 miles high, starts occurring at 100 miles or so, there is the possibility that if you intercept those warheads that it is conceivable that they might go off.

What we have done is design these terminal defense systems with that possibility in mind so that even if that occurs there would be no det—there would be no damage to the targets on the ground as a result of that. What we have done is we have ensured that the intercept of the missiles in that phase occurs sufficiently high and far away from the target so that if they did detonate—and we think that they still might not—but if they did the target still would not be damaged.

Mr. KASICH. What about nuclear fallout?

Mr. GARDNER. Well, the most——

Mr. KASICH. That is what I am referring to. If you hit this thing and it is, you know, 80 miles high, does the fall——

Mr. GARDNER. Well, the most, interestingly, the most severe fallout that—fallout is largely the result of nuclear detonations that occur right on the ground. That is, when a nuclear warhead detonates on the ground it creates a huge suction and picks up a lot of dirt and debris from the ground and pulls it up in a chain to very high altitudes. The winds then blow that nuclearly radiating debris as it will and then it slowly over time falls out. That is the result of a ground detonation, a detonation at or close to the ground.

A detonation that would occur at 50,000 or 75,000 or 100,000 feet does not have that effect. And there is little to no fallout that results from those detonations, certainly nothing like the amount that would occur in the other case.

Mr. COURTER. Plus, I guess if it is going to go off it is better off when it is 50 miles in the air.

Mr. KASICH. Oh, absolutely.

Mr. GARDNER. Yes. Well, of that there is no question.

Mr. KASICH. No, no. I mean there is no question about that. But I just wondered, Sam, if—I mean, I am just trying to learn this stuff—if the thing is up there and you take it out does it still cause, you know, loss of hundreds of thousands of lives because of fallout or——

Mr. STRATTON. Oh, no.

Mr. GARDNER. We believe the answer to that is, the answer to that is no, it does not.

Mr. STRATTON. Is it possible that they might get up high enough so they would keep on orbiting and you would get several nuclear weapons going around the Earth that had not been shot down?

Mr. GARDNER. Well, the United States has no capability of that kind. And our missile systems are not capable of putting their nuclear weapons into orbit.

[Deleted.]

Mr. STRATTON. They had a fractional orbiting bomb, yes.

Mr. GARDNER. That's, that is correct. That fractional orbiting system.

Mr. STRATTON. Can I ask a couple of other questions not on that some point? We are likely to get, I gather, in the coming debate, another ASAT amendment, anti-ASAT amendment very largely, I think along the lines of the proposal by Congressman George Brown. And that is designed to prevent us from experimenting or trying out the ASAT and on the ground, as I understand it, I believe we incorporated it in the final version at least in the House last year, on the ground that we really are damaging the arms control process by trying to find out whether we have a better system than the Soviet Union.

That seems to me to be a rather futile operation. But I wonder if you could comment on that kind of an amendment because apparently it is going to be offered and we would like to be fairly knowledgeable on that source?

Mr. GARDNER. Well, we are somewhat concerned that it, that ASAT amendments could have a detrimental effect on our program. One of the reasons for that is that the technology that we are expanding on and improving is the same kind of technology that is being used in our current ASAT program.

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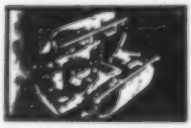
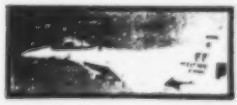
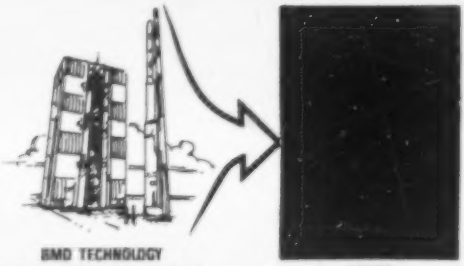




ASAT TECHNOLOGY



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DEBRIS

If you recall that little center vehicle, that miniature vehicle described there [deleted].

So there is a similarity of technology between these kinds of devices and what we would intend to use for some of our best kinetic energy weapons configurations.

So an amendment that stopped us from test, from doing those kinds of tests could also influence our ability to do similar tests in the SDI program down in the later stages of it as we get close to that stage.

So we would very much like to keep from having those kinds of constraints placed on our R&D program of that kind.

Mr. STRATTON. As I understand it, what our capability is at the present time or at least what our capability was a year ago was to fire something from an F-15. Is that still what you are going to talk about or develop in connection with the SDI?

Mr. GARDNER. [Deleted.] This ASAT program is designed to be launched from an F-15. [Deleted.]

Mr. STRATTON. All right. One final question.

We met with Secretary Weinberger the other day, yesterday morning, at breakfast and he was clearly enthusiastic about the fact that the Senate had provided $2.9 billion in the SDI program. If we could get the House to provide that same amount would that limit the damage that would be involved with the other cuts that we have been talking about?

Mr. GARDNER. Yes. Yes, we believe so.

Mr. STRATTON. You could live with it? You could live with $2.9 billion?

Mr. GARDNER. The program could move forward, we believe, quite significantly at that $2.9 billion number.

Mr. STRATTON. Thank you very much.

Any other? Any other questions?

Mr. Kasich.

Mr. KASICH. I wanted to ask about ASAT a little bit. And it is my understanding the Soviets have an operational ASAT at the present time.

Mr. GARDNER. That's correct.

Mr. KASICH. We do not?

Mr. GARDNER. That's correct.

Mr. KASICH. What makes theirs operational? What do we need to do to achieve it? And what does it mean when they talk about being able to move at a point in space? Is that what gives you the operational capability? If you could.

Mr. GARDNER. The Soviets' ASAT system is designed in a way that is significantly different from the way ours is designed. That is the first thing to understand. It performs by a technique of orbital rendezvous and detonation rather than interception in a more normal sense. And let me try to give you a sense of that.

If you have a satellite orbiting let's say at 1,000 miles altitude, there it is going around and around the Earth, the Soviet Union's antisatellite systems operates in such a way that they launch it into an orbit similar to the one that our satellite is in. It goes around with it, close. And it approaches our satellite in orbit at a very low velocity. And it slowly sidles up to our satellite, activates a radar tracker to track our satellite and find out where it is in more detail, and then approaches it slowly. And as it gets to its point of closest approach [deleted] and essentially tears our satellite to pieces.

It is capable of doing that up to satellite altitudes on the order of 1,000 to 2,000 miles. And it has a limited ability to do this sidling maneuver.

Mr. KASICH. What maneuver?

Mr. GARDNER. This maneuver, this coorbiting interception maneuver, this maneuver, this ability to close onto our satellite and destroy it.

Our ASAT system is designed considerably differently from that. [Deleted.]

And it operates on what we would describe as a direct, a direct ascent trajectory. That is, when a satellite comes over the Earth our ASAT interceptor, based on the information of where the satellite is and where, and what orbit it is in and where it is headed, and we launch our little vehicle more or less straight up. And as the satellite comes over our vehicle goes up, homes with, and directly collides with the satellite.

So it operates on a different set of principles and it is very, very much smaller. Our ASAT interceptor only weighs a few thousand pounds in total. It can be lifted and carried by an F-15.

The Soviets' ASAT, which has been operational for a number of years now, 5 to 7 years as I recall, has to be launched on a ballistic missile [deleted].

So the two operate on basically different principles.

Mr. KASICH. How do we know theirs works?

Mr. GARDNER. [Deleted.]

John?

John said that he thinks it is something like [deleted].

Mr. KASICH. Do they have a coorbiting satellite? Is that what it would be?

Mr. GARDNER. That's correct. It——

Mr. KASICH. Doesn't theirs make a lot of sense? We have to be pretty accurate. If theirs is able to move and move in close, has the capability to do that, isn't that a more effective system than one where you kind of have to shoot up there and——

Mr. GARDNER. Well, in some respects it is. But we believe in other respects our approach is much superior. [Deleted.]

So that if a satellite knew that it was being attacked by the Soviet system it itself could maneuver away from it and avoid destruction, which is the reason that we are attempting to get the space surveillance capability that I have described earlier is to know when such a thing like that was occurring.

Our system can handle very rapid approaches. And it probably scares the Soviet Union a great deal. It is more advanced technology than their system. Of course, we do not have ours and they have theirs. So it washes away.

Mr. STRATTON. Have they ever knocked down one of our satellites?

Mr. GARDNER. [Deleted.]

Mr. KASICH. If I could talk just a little bit about, you know, people say we are trying to move this SDI and they are yelling and screaming. And I would assume that when we talk about their capability in space defense we are essentially talking about their hen house radars and the Galosh missiles that surround Moscow. Now their new radars—is that what essentially what we are talking about when we talk about their effort at SDI?

Mr. GARDNER. Well, those of course are part of it. But——

Mr. KASICH. I understand it is part of the ABM, but is that also the most tangible picture of what they are doing in SDI?

Mr. GARDNER. Well, what the Soviet Union is doing is I think probably best typified by the tortoise and hare kind of a little story. They have been routinely, steadily plodding along like a tortoise building up their defensive capability. We raced ahead like the hare in the sixties and moved way beyond them in our capabilities.

At the time that the safeguard and site defense systems were being designed and tested the Soviet Union could not begin to build those kind of defenses. But what we did, like the hare, was we sat down and sort of went to sleep for 10 years. And they have kept moving along steadily, plodding along building on their capability. [Deleted.]

Mr. KASICH. What are those systems?

Mr. GARDNER. [Deleted.]

Mr. KASICH. What are those systems?

Mr. GARDNER. [Deleted] SA–X–12, a mobile defense against ballistic missiles of shorter range like the Pershing II. [Deleted.]

Mr. KASICH. I will yield to Mr. Courter for a——

Mr. COURTER. Yes. Are any of those of the SA–X–12 [deleted] what stage of development are they in and are they designed to be

deployed as a point defense around Moscow conforming with the ABM Treaty?

Mr. GARDNER. Let's see, I could answer that. But, John, perhaps you would like to answer that question.

This is John Sellers who is the expert from the Defense Intelligence Agency that makes his living understanding these issues.

Mr. SELLERS. [Deleted.]

Mr. KASICH. Where is that?

Mr. SELLERS. [Deleted.]

Mr. GARDNER. [Deleted.]

Mr. SELLERS. [Deleted.]

And that has been our concern, you know, with these large radars going in that they could be the long lead time component of putting out such a defense. [Deleted.]

Mr. COURTER. Is the SA-X-12 going to be deployed around Moscow? Is that what we assume?

Mr. SELLERS. It's——

Mr. COURTER. Well, if it is not, I mean I guess the question I have is I have read all sorts of material on, you know, alleged Soviet violations of arms control agreements. We know about Krasnoyarsk radar. We know about all sorts of other things [deleted], you know, the SS-16's and all the other stuff that goes with it. [Deleted.]

Mr. GARDNER. Well, let's see. Let me try to answer that.

Mr. COURTER. Yes.

Mr. GARDNER. It is not currently—The way it is being handled by them it has not been identified as a violation and we do not believe that it is.

Mr. COURTER. What do they say they are going to be used for?

Mr. GARDNER. They do not say.

Mr. COURTER. Air defense?

Mr. GARDNER. Well, they, it is permissible that they do research and development [deleted]. That is permissible technology development.

Mr. KASICH. Would the gentleman yield?

Is the operable language in that treaty testing against an object as it reenters, is that the——

Mr. GARDNER. Well, let's see. The ABM Treaty allows you to do research and development and testing of a defense system that is fixed and land based. And the Soviet Union has very carefully structured the test program [deleted] that it satisfies the letter of the law of that treaty of being fixed and land based.

So the ARM X-3, until they deploy it someplace other than at Moscow, is not a violation. [Deleted.]

Mr. STRATTON. I think it might be a good idea if we gave Mr. Gardner a little break here. He has been going for quite a while. And I think he has been giving us some very excellent material to use on the floor.

And maybe if some people have additional questions you could discuss it over the table.

I want to thank you very much, Mr. Gardner, for your patience, your time, your expertise. And we certainly have gained a lot of help from your testimony today. And I hope we have not worn you

out. But we have a lot of opposition to this system and we need to try to pick up some understanding to defend it on the floor.

Thank you.

Mr. GARDNER. It was my pleasure to be able to talk to you, Mr. Stratton.

Mr. STRATTON. Thank you very much.

Mr. GARDNER. And I appreciate the invitation.

Mr. STRATTON. We stand adjourned subject to the call of the Chair.

[Whereupon, at 3:43 p.m., the committee adjourned, subject to the call of the Chair.]

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